RAILROAD GAZETTE

FRIDAY, APRIL 19, 1878.

Contributions.

Apparatus for Coaling Locomotives.

NEW YORK, April 12, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In one of your back numbers, you gave some very interesting information in regard to structures for measuring or weighing coal to locomotives.

As I have spent some time and labor on that particular feature of railroad work, I should be obliged, if you would allow me space to add a portion of my small stock of experience to that already published.

The accompanying engraving shows a coaling station which I built for this purpose, in 1875. In its construction I was governed by four very important points: cost of structure, cost of handling coal, time taken to coal each engine, and capacity of structure or stock room.

In describing my plan, which, I think, meets all four of these requirements as near as may be, I will begin at the top of the station *B C*, where the coal is delivered by a locomotive in the regular drop-bottom coal cars, by the use of the inclined plane *A*, fig. 1. The coal is then unloaded into the pockets from either of the tracks *B* or *C*, fig. 3. The track *B* is used for dumping the coal intended for daily use, and *C* for stocking coal. The coal is then drawn from the chute *D* into the small car *E*, as it is needed. This car can be moved the entire length of the station, on a track on the floor *F*, and also pushed out over a tender standing on the line, and dumped, by the use of small turn tables and the swinging track *H*. The chutes *D* extend the entire length of the station, with as many mouths as possible, so that the coal for the daily supply may be reached without labor. The mouths are protected by heavy cast-iron doors, so that the flow of coal may be cut off when the car is full.

A swinging track, *H*, is fastened to the front of the station, hinged at the lower end and hung on chains with counter weights, and windlass attached at the other end, by means of which the track can be lowered into position over the tender, or run up out of the way in one-quarter of a minute. Just opposite the end of this track there is a small turn-table on the track on the floor *F*, on which the cars are turned and run out. Two tracks are used, and are placed so that two engines can be coaled up at once when desired. The 2-ton drop-bottom cars used for delivering the coal are of peculiar construction, the door being in one piece, hung at one end on hinges, and having a spring catch on the other. This spring catch is worked by a rod, which passes through the frame to the front end of the car, so that when the car is pushed to the outer end of the swinging track, this rod coming in contact with a bumper drives back the spring, which allows the door to drop. The door [shown below, *E*, fig. 3] is 4 ft. × 3 ft. 6 in., and through this opening all the coal readily drops at once. After being emptied the car is pulled back to the station, on reaching the front timber of which the door is caught on a roller, pushed back into position, and is fastened automatically, and the car is then ready to be re-loaded. By the use of this whole contrivance an engine can be loaded with four tons, or any part of that quantity, in less than three minutes, by two men, as the whole performance consists in lowering the track, running out first one car, returning it to the station, running out another car, returning it, and winding up the track. One great advantage gained by this system over the old slides is that the car in this instance drops the coal just on the centre of the tender, and thus the tender can, when desired, be loaded to its greatest capacity without any loss of time for shoveling.

The stock coal, as will be seen from the plan, is in such a position that it can be pushed forward into the chutes with a very small amount of labor, when needed.

The station above described cost, in round figures, $8,000, inclined plane included. Forty engines per day of 24 hours, are coaled up there, which consume 120 tons of coal, the entire cost of handling which is the pay of one foreman and three men, at a total of $5.80 per day, making the cost per ton 4⅚ cents. This force is divided into two gangs, two men working by day and two by night; they do the entire work at the coaling station, including unloading the coal in the first instance, keeping the accounts, etc., etc., and have given good satisfaction for two years, which may be taken as a pretty thorough test.

In another case, where a much smaller station was needed, I put one up on the same plan, at a cost of $4,800, including a woodshed under the floor *F*, and a sand-dryer in the inclined plane. This station I work with two men, one by day and one by night; but in this case the fireman of the engine taking coal is required to help lower the track and run out the car. At a point where actual weight was desired in place of measurement, I placed under the turn-table a three-ton scale, which works quickly, and has given entire satisfaction for two years.

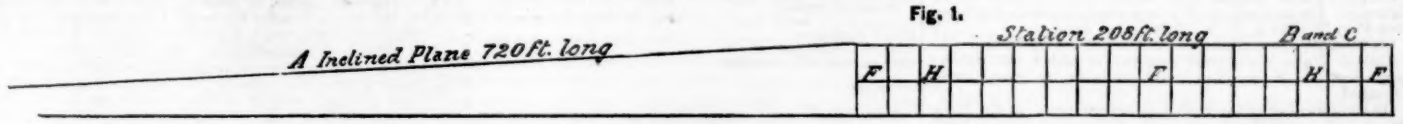
I have examined all the plans now in use on the principal railways in this country, for measuring the coal taken by locomotives, and I do not hesitate to say that this is really the cheapest and most thorough in practice, and would like to call the attention of some of our railroad officials to the fact that shoveling the coal for the use of engines is one of the last traces of the dark ages, and that big platforms which cover any amount of land are of very little use, and cost money in every way. Also, that platforms 6 ft. and 8 ft. high, are more expensive than they imagine, or is at all necessary. Of course where coal is taken at a station from both tracks of a double-track road, a bridge is necessary, in place of the swinging track above described. This would make the station about 8 ft. higher; but the addition in first cost would not be great, and the cost of operation would, of course, be just the same. Wherever the systematic weighing and keeping account of the fuel consumed by each engine has been introduced, it has resulted in a very marked reduction in quantity of coal per car per mile consumed by almost every engine on the road, until the minimum has been reached.

The benefits arising from this system must be of immense importance, as not only can a very great economy be effected in the saving of fuel thereby, but it has been found also that it invariably tends to the working of the locomotives up to their full capacity as far as possible, and this of course still further reduces the quantity of coal burned per ton of train hauled each mile.

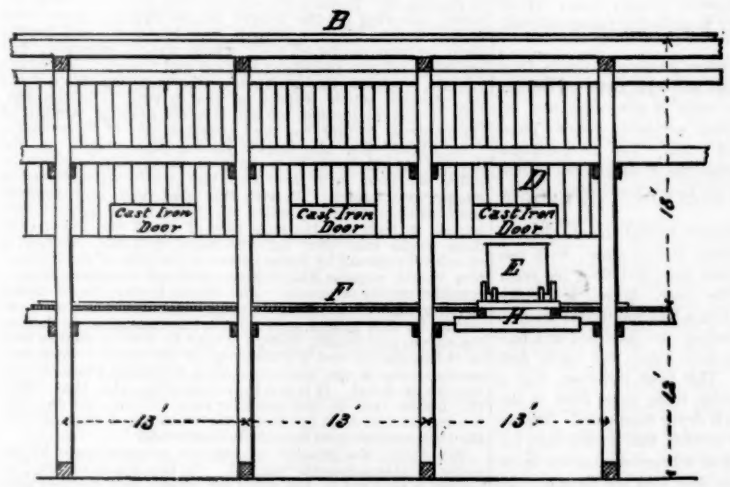
The comparison afforded by this means of the actual work done per ton of fuel by each locomotive is also of very great service in determining the merits of various classes of locomotives. These considerations have had so much weight with some of the leading railway lines of the country that they have considered it worth while to go to great expense, both in constructing large and complicated coaling stations, and also in operating them, for the purpose of obtaining this kind of information.

I have thought therefore that the foregoing description of an economical and simple means of measuring or weighing the coal given out to locomotives, as now in use on one of our most important lines, would be interesting to your readers. Truly yours, C. N.

Fig. 1.

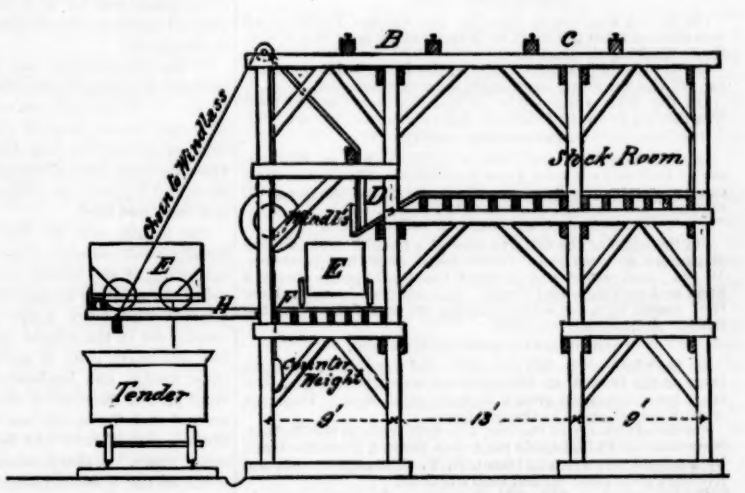


Front of Station



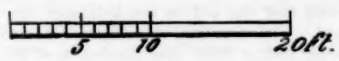
Front Elevation

Fig. 2.



End Elevation

Fig. 3.



LOCOMOTIVE COALING SHUTES.

Train Accidents in March.

The following accidents are included in our record for the month of March:

REAR COLLISIONS.

On the night of the 1st a freight train on the Lake Shore & Michigan Southern road ran into the rear of a preceding freight near Linndale, O., damaging several cars.

On the morning of the 2d a freight train on the New York Central & Hudson River road ran into the rear of a preceding freight, which had stopped for water at Tivoli, N. Y., wrecking the caboose, throwing two loaded cars into the Hudson River, and killing a man in the caboose. The accident is said to have been caused by the neglect of the switchman at the station to show the usual signal.

On the evening of the 2d three cars of a passenger train on the New York & New England road, cut loose to make a flying switch at Hyde Park, Mass., ran into some cars upon another track, doing much damage and injuring two persons

On the afternoon of the 5th a freight train on the Illinois Midland road broke in two near Paris, Ill., and the detached section afterward ran into the forward cars, doing some damage.

On the evening of the 9th a freight train on the Troy & Boston road broke in two near Williamstown, Mass. When the engineman stopped his part of the train the detached cars ran into it, wrecking nine cars and blocking the road several hours.

Late on the night of the 11th, a Pennsylvania freight train which was going upon the New Jersey Central track at Elizabeth, N. J., ran into a Central milk train. The Pennsylvania engine and four Central cars were badly damaged, a trainman hurt, and the track blocked four hours.

On the morning of the 12th a coal train on the Philadelphia & Reading road ran into a preceding coal train in a cut near Bridgeport, Pa., damaging the engine, wrecking a number of cars, killing the fireman, injuring the engineman and two brakemen.

On the morning of the 12th a passenger train on the Springfield Division of the Ohio & Mississippi road ran into the rear of a freight train which was standing on the main track at Taylorville, Ill., damaging several cars.

Early on the morning of the 15th a shifting engine in the Erie yard at Hornellsville, N. Y., ran into the rear of a freight train, damaging a car and injuring a brakeman.

BUTTING COLLISIONS.

On the morning of the 9th a passenger train on the Wilmington & Weldon road ran into the head of a freight, which was making up on the main track in Goldsboro, N. C. Both engines and some freight cars were damaged. There was a thick fog at the time, and it is said that the freight conductor kept the main track, though he knew the passenger was due.

Early on the morning of the 19th an express train on the Pittsburgh, Cincinnati & St. Louis road ran over a misplaced switch and into the head of a yard engine, which was standing on a siding at Dennison, O. Both engines were damaged and a fireman hurt.

On the morning of the 19th there was a butting collision between a freight train and a stock train on the Marietta & Cincinnati road in Cincinnati, O., by which much damage was done to engines and cars and two trainmen were hurt.

CROSSING COLLISION.

On the 26th an engine on the Erie Railway, while standing in the yard at Buffalo, N. Y., started off from some unexplained cause and ran into a Great Western passenger train, which was crossing the Erie track, upsetting and damaging the engine and one car.

DERAILMENTS, BROKEN RAIL.

On the morning of the 4th three cars of a passenger train on the Intercolonial Railway were thrown off the track by a broken rail near Campbellton, N. B.

On the 9th nine cars of a freight train on the St. Louis, Rock Island & Chicago were thrown from the track at

Upper Alton, Ill., by the breaking of a guard rail on a curve. The cars, which were loaded with ice, were badly wrecked.

Very early on the morning of the 14th a passenger train on the Union Pacific road struck a broken rail near North Platte, Neb., and four cars were thrown from the track, two of them being badly broken.

DERAILMENT, BROKEN WHEEL.

On the night of the 24th a stock train on the Cheshire road was thrown from the track near Ashburnham, Mass., by the breaking of a wheel under one of the cars. Several cars went down a high bank and were wrecked, killing a lot of hogs.

DERAILMENTS, BROKEN AXLE.

On the afternoon of the 10th as a Pennsylvania Railroad stock train was running over the Delaware & Bound Brook road near Hopewell, N. J., an axle broke under a car and ten cars were piled up in a bad wreck, blocking the road several hours.

On the morning of the 14th the engine of a passenger train on the Missouri Pacific road was thrown from the track at Atchison, Kan., by the breaking of a driving axle. The axle broke off close up to the hub of a wheel, and a crack had evidently extended half way through it for some time.

DERAILMENT, BROKEN BRIDGE.

On the morning of the 11th a freight train on the Jackson, Lansing & Saginaw road went through a bridge over Marsh Creek, near St. Charles, Mich., the abutments of which had been washed out by the giving way of a dam just above it. The engine and seven cars were wrecked, the fireman killed and the engineman badly hurt.

DERAILMENTS, WASH-OUTS AND LAND-SLIDES.

Very early on the morning of the 13th a freight train on the Pittsburgh, Fort Wayne & Chicago road ran into a washed-out culvert near Lakeville, O., wrecking the engine and several cars, killing the engineman, injuring the fireman fatally and a brakeman less severely.

On the 13th a freight train on the Utica Division of the Delaware, Lackawanna & Western road ran into a wash-out near Port Dickinson, N. Y., doing some damage.

On the 25th the engine and two cars of a coal train on the Seattle & Walla Walla road ran into a washed-out culvert near Seattle, Wash. Ter., and the engine was badly damaged.

On the morning of the 26th a passenger train on the Pittsburgh Division of the Baltimore & Ohio, ran into a land-slide near Mineral Point, Pa., and the engine and tender were thrown across the track and damaged. The road was blocked several hours.

DERAILMENTS, SNOW.

On the 9th a wrecking train on the Kansas Pacific road was thrown from the track by a snow-bank near Box Elder, Kan., blocking the road badly.

On the 10th a passenger train on the Denver Pacific road ran off the track in a snow-drift, near Summit, Col.

On the 10th a snow-plow on the Colorado Central road was thrown from the track in a heavy drift at Taylor's, Col.

DERAILMENT, CATTLE.

On the night of the 18th a freight train on the Pensacola Railroad ran over a cow near Molino, Fla., and several cars were thrown from the track, blocking the road all night.

DERAILMENT, ACCIDENTAL OBSTRUCTION.

On the night of the 6th five cars of a freight train on the Baltimore & Ohio road broke loose near Independence, W. Va., and afterward jumped the track, going down a bank and making a bad wreck. The accident is said to have been caused by a draw-head pulling out and falling on the track. A trainman was hurt.

DERAILMENTS, MISPLACED SWITCH.

On the night of the 5th the engine and four cars of a freight train on the Boston & Albany road were thrown from the track by a misplaced switch in Springfield, Mass. Two cars were damaged and a brakeman hurt.

On the afternoon of the 9th, a freight train on the Buffalo, New York & Philadelphia road was thrown from the track by a misplaced switch at Olean, N. Y. The engine upset and five cars were piled up and badly broken.

On the morning of the 23d, the engine of a passenger train on the Fitchburg road was thrown from the track by a misplaced switch at Greenfield, Mass., blocking the road two hours.

DERAILMENTS, UNEXPLAINED AND MISCELLANEOUS.

On the 2d, some cars of a stock train on the Erie road ran off the track at Hankins, N. Y., and one was wrecked.

On the 7th, nine cars of a freight train on the Louisville, Cincinnati & Lexington road ran off the track near Frankfort, Ky., blocking the road five hours.

On the morning of the 9th, a freight train on the Allegheny Valley road ran off the track near Red Bank, Pa., blocking the road some time.

On the night of the 13th the engine and some cars of a freight train on the Erie road ran off the track at Castile, N. Y., blocking the road four hours.

On the morning of the 14th some cars of a freight train on the Missouri, Kansas & Texas road jumped the track on a high trestle near Boonville, Mo., blocking the road several hours. The guard timbers prevented the cars from leaving the trestle.

On the afternoon of the 15th a yard engine on the Pittsburgh, Wheeling & Kentucky road jumped the track on a curve in Wheeling, W. Va.

On the night of the 15th four cars of a freight train on the Chicago & Lake Huron road ran off the track in Flint, Mich.

On the 16th six cars of a freight train on the Florida Central road ran off the track near Jacksonville, Fla., and some of them were badly broken, blocking the road several hours.

On the night of the 17th an engine, which had been left standing on the Illinois Central track in Cairo, Ill., started in some way and ran down the track to the turn-table and went down into the pit.

On the night of the 22d some cars of a freight train on the Grand Rapids & Indiana road ran off the track near Fort Wayne, Ind., and one car was badly wrecked.

On the morning of the 26th the engine of a freight train on the Pittsburgh, Wheeling & Kentucky road ran off the track in Wheeling, W. Va.

Early on the morning of the 29th a freight train on the Erie Railway ran off the track near Hornellsville, N. Y. The engine was thrown across the track and 18 cars were piled up together, most of them being badly broken.

On the 29th a passenger train on the Atlantic & Great Western road ran off the track near Jamestown, N. Y., blocking the road some time.

BOILER EXPLOSION.

On the 3d or 4th of the month the engine of a passenger train on the Brunswick & Albany road exploded its boiler near Albany, Ga., while running at a moderate speed. The fireman was thrown 15 feet and badly hurt.

OTHER ACCIDENTS.

On the 9th as a freight train on the Central Railroad of Georgia was near Milner, Ga., a flat car loaded with cotton caught fire from a spark from the engine, and two cars with 80 bales of cotton were destroyed.

Very early on the morning of the 11th the mail and baggage car on an express train on the Lake Shore & Michigan Southern road, near Edgerton, Ind., caught fire. Before the fire was discovered and the train stopped the fire had gained such headway that the car was completely destroyed, with most of the baggage and all the mails.

On the evening of the 27th, as a passenger train on the Boston & Albany was near Jamesville, Mass., a connecting rod broke, doing some damage.

This is a total of 49 accidents, whereby 5 persons were killed and 14 injured. Four accidents caused the death of one or more persons; seven caused injury less than death, leaving 38, or 77.6 per cent. of the whole number, from which no serious injury to persons is recorded.

As compared with March, 1877, there is a decrease of nine in the number of accidents, of four in the number of killed and of 17 in that injured.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:		
Rear collisions	9	
Butting collisions	3	
Crossing collision	1	
		— 13
DERAILMENTS:		
Unexplained	12	
Broken rail	3	
Broken wheel	1	
Broken axle	2	
Broken bridge	1	
Wash-out	3	
Land-slide	1	
Snow	3	
Cattle on track	1	
Accidental obstruction	1	
Misplaced switch	3	
Runaway engine	1	
		— 32
Boiler explosion	1	
Broken connecting rod	1	
Cars burned while running	2	
		—
Total		49

Two collisions were caused by trains breaking in two, and one each by failure to use signals, by a misplaced switch, by fog, by a flying switch and by a runaway engine. The broken bridge recorded failed on account of the washing out of its abutments by a flood from a broken dam. There were 14 accidents traced directly to defect or failure of road or equipment.

Of the collisions one was between passenger trains, four between a passenger and a freight, and eight between freight trains; of the derailments seven were of passenger and 25 of freight trains; three of the other accidents were to passenger trains and one to a freight train. The 13 collisions killed two and injured nine persons; the 32 derailments killed three and injured four, while in the four other accidents only one man was hurt.

The month calls for little remark, except to note the unusually small number of accidents, the smallest, with one exception, of any month for a year past, and 28.4 per cent. below the monthly average for the year. March is usually a month when track is apt to be in a bad condition; frost is coming out of the ground, upheaving the road-bed and ballast, and heavy rains or melting snow soften the earth and cause washes and land-slides. This year, however, over a large part of the country there was little or no frost in the ground and the month was much dryer than usual. Probably less care of road has been needed this spring than for many years. A sharp reminder of winter came in the snow storm on the Western plains, but that took the form of rain further east and did not do much damage this side of the Mississippi. The number of collisions is comparatively small, being only a little over one-fourth of the whole. A curious feature is the two accidents, one collision, and one derailment, from engines "running away." This should be a reminder to enginemen to be careful that their throttle valves are tight shut and the links on the centre when they leave their engines standing alone with steam up.

For the year ending with March the record is as follows:

	No. of Accidents.	Killed.	Injured.
April	69	13	34
May	46	12	41
June	49	16	92
July	53	21	144
August	98	46	220
September	84	20	88
October	82	31	112
November	83	23	70
December	66	8	26
January	75	23	77
February	67	8	31
March	49	5	14
Totals	821	226	949

The averages per day for the month were 1.58 accidents, 0.16 killed, and 0.45 injured; for the year they were 2.25 accidents, 0.62 killed, and 2.60 injured. The average casualties per accident were, for the month, 0.102 killed, and 0.286 injured; for the year, 0.275 killed, and 1.156 injured.

Locomotives Compared with Horses—Results in Massachusetts.

[A paper read before the Boston Society of Civil Engineers, March 20, 1878, by Edward Appleton, C. E.]

A few weeks ago a question was asked me which I was not ready to answer at once, but which I could answer, I thought, after a few days' research. The inquiry became interesting to me as I followed it, and perhaps it may interest some of the members of the society also. The question asked me was:

"How many horses would be required to perform work equivalent to that done by the locomotives in use on the railroads of Massachusetts?"

A nominal horse power is that necessary to raise 33,000 lbs., one foot high per minute; an estimate first made by Boulton & Watt in selling their steam-engines. Trautwine says that this assumption can really be carried out by a strong horse day after day for 8 or 10 hours; but as an engine can work day and night without stopping, while a horse cannot, a one-horse engine can do much more work than any one such horse. Boulton & Watt meant that their one-horse engine could *at any moment* perform the work of a very strong horse.

Trautwine estimates that a good, average trained horse, weighing about half a ton, well fed and treated, can walk 10 hours per day at the rate of 2½ miles per hour on a good level road, and exert a continuous pull or tractive force of 100 lbs. On a level piece of good road, he estimates the traction at 60 lbs. per ton of load and carriage; so that the 100 lbs. of tractive force exerted by the average horse enables him to pull a load of 1⅔ tons at the rate of 2½ miles per hour for 10 hours per day on a good level road.

Trautwine gives the weight of a train, exclusive of engine and tender, which a good locomotive, weighing 27 tons or 60,480 lbs., all on the drivers, can haul on a level railroad, at a moderate speed, say 8 to 12 miles per hour, as 1,458 tons, an estimate corresponding very nearly with the amount of work which the Baldwin Company guarantee their locomotives of similar size to perform. This locomotive then will haul a load as heavy as 878 horses could pull at the rate of speed assumed above for them on good common roads; but as it hauls this load at an average speed of four times that of horses, it is doing the work of 3,512 horses, and is capable of doing it, not merely for 10 hours per day, but for nearly the whole 24. If the horses, however, were hauling upon a level railroad instead of a common road, it would not require so many of them to do the same work. Haswell gives a table of the comparative useful effect of the power of an average horse on a turnpike, a railroad and a canal. He rates the tractive force of the horse at 83.3 lbs., and says that a horse, traveling at the rate of 2½ miles per hour for 11¼ hours per day, will exert a useful effect equal to 14 tons drawn one mile on a turnpike, 115 tons on a railroad and 520 tons on a canal. Making the hours of work and the tractive force agree with those of Trautwine, the average horse would draw 110 tons one mile on the railroad, or for his whole distance of 25 miles in 10 hours, he would draw $4\frac{4}{10}$ tons. The locomotive above described then draws as many tons as 331⅓ horses could pull on the same railroad: and as it draws them at four times the speed of the horses, it does as much work in the same time as 1,325 horses.

The total miles of railroad included in the returns made to the Massachusetts Railroad Commissioners for 1877, adding the double track but not the sidings, is 3,124, of which 2,295 are in Massachusetts. The whole number of locomotives used by the corporations reporting as above is 1,031; and the proportion due to the miles in Massachusetts is 757. The average weight of the locomotives is not given in the report for last year; for the previous year it is given, sometimes in tons, sometimes in pounds. Supposing the tons to mean 2,000 lbs. each, 886 locomotives reported averaged 58,839 lbs. each. But we do not know how much of this was carried by the drivers, which shows the effective power of the engine. Some of the engines were tank switching engines, carrying all the weight on the drivers; some were heavy freight engines with 6, 8 or 10 drivers, and having eight or nine-tenths of their whole weight effective; but probably all the passenger engines and many of the freight engines were of the common style, carrying from $\frac{6}{10}$ to $\frac{6.5}{10}$ of their whole weight on the drivers. For the purpose of this calculation, we will take the average weight of the engines, 58,839 lbs. and consider $\frac{6.5}{10}$ of it effective, *i. e.*, 38,245 lbs. An engine having this weight on the drivers should be able to haul, at an average speed of 10 miles per hour on a level road, 925 gross tons, exclusive of engine and tender. To haul this load on a good common road, at the rate of 2½ miles per hour, would require 557 horses; to haul it at the same rate of speed the locomotive does would take four times as many, or 2,228. To haul it on a level railroad by horse power at the rate of the locomotive would require 840 horses. It is not necessary here to consider curves or grades. The engine is *capable* of doing that amount of work on a straight and level road, and, exerting its full power, will do what is equivalent to that on the curves and grades, though it may be with a smaller load or at less speed; and it would require the number of horses above given to do the same work which the locomotive is *capable* of doing. It is not to be forgotten, also, that while the horses can do this work for only 10 hours per day, the locomotive can do it for nearly the whole 24, deducting only the time necessary to take in fuel and water.

We found the number of engines proportionate to the miles in Massachusetts was 757. Of this whole number, of course, a part are in the shops for repair, and another part may be in the stalls waiting orders. I will deduct 10 per cent. of the whole number on these accounts, which will leave 682 engines constantly at work, without doubt averaging as many hours per day as was allowed for the horses, and I think it probable they average more. Now, as it would require 840 horses to do the work of an average locomotive on a level railroad, to equal these 682 engines in effective power on the railroad would require 572,880 horses; and to accomplish the same effect on a good common road would require 1,519,496 horses. It is also to be borne in mind that this calculation applies merely to the amount of freight and cars which could be hauled at a moderate rate of speed; and that it would be simply impossible for any number of horses to haul the heavy passenger trains at the rate of 40 or 50 miles per hour, which some of our locomotives are constantly doing.

The above calculation shows the number of horses requisite to do the amount of work which our locomotives are *capable* of doing. Let us now examine the returns to see how much they actually performed.

The number of tons of freight hauled one mile by the roads reporting to the Massachusetts Commissioners for the year ending Sept. 30, 1877, was 684,810,604; and the average dead weight hauled one mile as per Commissioners' table was $3\frac{144}{1000}$ tons for each ton of paying freight, making the total weight hauled one mile 2,837,855,143 tons (of 2,000 lbs. each, I suppose). In proportion to the miles of railroad in the state, the amount would be 2,084,784,748 tons. The rate of speed of freight trains is not given in the last report; in that of the previous year it varied on the different roads from 7 to 22 miles per hour, and averaged very nearly 13 miles per hour; we will suppose it the same for the last year. As 25 miles per day is the distance for which the average horse can haul his load, the number of tons, freight and cars, hauled one mile will be equal to 83,391,390 tons hauled 25 miles. Assuming 350 days as the average number of working days in the year for freight trains, we shall have 238,261 tons to be moved 25 miles each day. And as the load of the average horse was put at $4\frac{4}{10}$ tons on a level railroad, it would require 54,150 horses to haul this load at their rate of speed of 2½ miles per hour. As the locomotives haul the same load at an average of five times the speed of the horse, it would require five times as many, or 270,570 horses, to equal the effective force which the locomotives have exerted the past year in transporting freight on our railroads; and this estimate is on the supposition that the railroads were level for their whole length. To accomplish the same amount of work on good level common roads, 717,655 horses would be required.

It would be desirable to know how much to add to the numbers of horses above given on account of grades and curves. But the reports since 1870 have given no returns whatever on these subjects, and those previously made were so imperfect that they could not be used as a basis for computation.

Let us see now what the locomotives on our railroads accomplished in carrying passengers the last year. The number of passengers carried one mile by the roads reporting last year was 103,278,126. Estimating their average weight at 150 lbs., we have 7,745,859 tons (of 2,000 lbs. each) of passengers hauled one mile. Add to this 2.091 tons of dead weight for each passenger, as per Commissioners' tables, we have a total of 319,232,687 tons of passengers and cars hauled one mile. The proportion of this for the length of roads in the state is 234,519,531 tons. These passengers were carried at rates of speed varying from 15 to 38 miles per hour, including stops, averaging very nearly 25 miles per hour.

In old stage times, a rate of 10 miles per hour on a good smooth road was full as much as the stage lines expected to average, and to do this it was necessary to change horses every 10 miles. Haswell says that a horse can only travel 13 miles a day, at the rate of 10 miles per hour, drawing a load; but probably this means a continuous pull. To be sure that we credit the horses with all that they can do, we will suppose that they have one or more rests, and thus accomplish 15 miles per day, at the rate of 10 miles per hour, drawing a load. The horse's tractive power diminishes as his speed increases, and at the rate of speed proposed would not exceed 25 lbs., enabling him to pull but $\frac{1}{100}$ of a ton on a good level common road; and calculating, as before, in regard to freight, he would be able to pull on a level railroad $1\frac{1}{10}$ tons, at the rate of 10 miles per hour, for $1\frac{1}{2}$ hours per day, and this would be his whole day's work.

Fifteen miles per day being the distance allowed for each horse in the passenger service, the number of tons of passengers and cars hauled one mile will be equal to 15,634,635 hauled 15 miles. Divide this by 365, as there is hardly a day in the year on which some passenger trains do not run, and we have 42,834 tons per day. At $1\frac{1}{10}$ tons per horse, it would require 32,949 horses to keep this weight moving at the rate of 10 miles per hour on a level railroad. As the locomotives move the same weight at an average rate of speed $2\frac{1}{2}$ times as great, it would require 82,372 horses to do the same amount of work in the same time. The actual work in kind and quality done by the locomotives could not possibly be done by the horses. I only estimate the equivalent of it to be done by the horses in some manner within their power. To perform an equivalent amount of work on good common roads, would require 261,182 horses.

Adding together the results ascertained in the freight and passenger service as actually done by the locomotives, it would require 352,962 horses to do an equivalent amount of work on the railroads of the state, provided they were all straight and level. I have no means of ascertaining the additional number required on account of grades and curves; every one must estimate this for himself. My own opinion would be that an addition of one-third would not be too much. And supposing an amount of work to be done by horses on good level common roads equivalent to that which has been done by the locomotives on the railroads, 978,837 horses would be required. That is the result of calculation. Now taking into consideration the average quality and condition of the common roads of the state, and the great amount of ascents to be overcome upon them, it seems to me it would not be setting the number too high to say that it would require 1,500,000 horses to do work upon the existing common roads of the state equivalent to that which has been done the past year upon our railroads by the locomotives.

Contributions.

Railroads in Australia.

AUCKLAND, New Zealand, Feb. 12, 1878.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I make some notes on the railways in these colonies, which may be of some service to you. As a rule, all the railways are in the hands of and under the control of the government.

I first visited New South Wales. From Sydney, two lines have been constructed, running together for some fifteen miles, then diverging, one running westerly to Orange, its present terminus, 194 miles from Sydney; the other southwest toward the Victorian frontier, having its present terminus 230 miles from Sydney. This line is approaching completion to Wagga Wagga (a place noted as the former home of the Tichborne claimant), some 40 miles further, and in the course of the next three years will be open to Albury on the Murray River, where it will connect with the Victorian railways already built.

The gauge of these roads (all in New South Wales) is 4 ft. 8½ in. The rails are of the double-headed pattern, 75 lbs. per yard, laid in chairs on red gum sleepers 5 in. thick, 8 in. wide and 9 ft. long, placed 3 ft. from centre to centre. The ballast is broken stone, kept in place by cut stone kerbing. These stones (kerb) are of various lengths, one foot wide and deep, laid on broken stone foundation, and in consequence of the absence of frost are easily kept in place. The ballast material is dark volcanic or gray sandstone. The bridges are of iron boiler-plate girders or lattice, built in England, or, what is more frequent, cut stone arches. The masonry is all excellent; the line and surface of rails is perfect, and in neatness the roadway is unsurpassed. All crossings are protected by gates; the watchmen's houses are of stone, cut, and substantially built.

On the Western line the gradients for the first 34 miles are undulating, and never exceeding 1 in 100, and the curves easy. Beyond this the *trouble* commences; a grade of 1 in 30 leads off to the left, one and one-half miles long; then switches back for a mile 1 in 33, then again 1 in 33, like a letter Z. This is called the Penrith Zigzag. From here to Clarence siding, 56 miles distant, there are 18 miles 1 in 33, changing to 1 in 55 and 1 in 66, with occasionally two or three hundred feet of level. The sharpest curves are 8 chains —528 ft.—radius. The line is located upon the crest of a volcanic range, the Blue Mountains, with relatively few high embankments or deep cuttings; in fact, the country appears designed for the railway. In many places there are cliffs upon either side a thousand feet or more in perpendicular. The views are magnificent; so grand that Cape Horn on the Central Pacific or Kittanning Point on the Pennsylvania Railroad sinks into insignificance.

The road descends as rapidly over another zigzag, called the Lithgow, into a valley of the same name some 100 miles from Sydney, passing from the sterile mountain region through coal and iron deposits into a rich agricultural region at Bathurst and extending to the terminus at Orange, with gradients of from 1 in 60 to level.

The motive power is English, with one exception—a Baldwin (American engine) 18×24 in. cylinders, 5 ft. wheels. The passenger engines are somewhat on the American type, the cylinders are 16, 17 and 18 in. ×24 in., the driving wheels generally 6 ft. diameter. The freight engines are 6 wheels coupled and some have a pony truck, 18 and 19×24 and 26 in. cylinders and 4 ft. 6 in. to 5 ft. wheels. Beyer, Peacock & Co. are the favorite builders. The passenger engines are supplied with the Westinghouse brake, and they, as well as the freight engines, have powerful screw brakes on the tender wheels and driving-wheels also, with water pipes leading to flanges of driving-wheels. The carriages are of English design, with three exceptions—an American sleeping car and first and second-class cars having been furnished last year by the Jackson & Sharp Co. The carriages, generally, have no brakes; the regular brake van does the work, and is supplied with sand boxes. The road is run very carefully. The maximum speed of passenger trains is 23½ miles per hour, including stops, and great caution is observed on steep grades.

The Southern line is straighter, but there are long heavy grades over the same mountain range; one some two miles or more in length is 1 in 30. This road is equally well built; and there is another line some 100 miles in length, extending from Newcastle (a port 60 miles north of Sydney) into the interior equal to the others in construction.

The Victorian gauge is 5 ft. 3 in. The character of construction is equal to that of New South Wales, save the kerbing. The railway from Albury to Melbourne, 136 miles, is a single line ballasted with gravel. That from Melbourne to Ballarat and Sandhurst double; rails double-headed; chairs, sleepers and ballast same as in New South Wales, the latter being of dark volcanic stone, which abounds in that colony. The bridges are very extravagantly built, and all the lines are neat and kept in admirable order.

The locomotives are English and "colonial," with the exception of two Rogers "American" engines 17×22 in. and 5 ft. wheels. The passenger engines are 16 and 17 in. × 24 in. and 6 ft. wheels, two pair coupled and a pair of leading wheels, in stiff frame usually. The freight engines are 16, 17 and 18 in. ×24 in., six wheels coupled. The speed of trains 23½ miles per hour; but as the grades are somewhat heavy in places, 1 in 60, the trains run slowly up and as fast as they can turn their wheels down. There are two Gilbert, Bush & Co.'s cars; the remainder English in design. The colony, believing in protection, goes in strongly for home manufactures. Locomotives have been and are still built at Ballarat, some of which have thrown the straight track 3 or 4 inches out of line.

There is a little private suburban line at Melbourne running through the suburbs some five miles in each direction, which does an enormous passenger business. The road is level; the engines are small affairs—tank engines, four drivers, and either with a two or four-wheeled truck. The cylinders are 9, 10 and 11 in. ×20 in., the wheels 4½ ft. They are all English, generally Stephenson & Co. They run fast, make frequent stops, get around rapidly. The carriages and system are English.

In South Australia the railways are of both 5 ft. 3 in. and 3 ft. 6 in. gauge. They are of very good character, more economically constructed than in the two colonies before named. The rails are of both patterns, double-headed and H. The ballast is both broken stone and gravel. The lines are well managed, and in many respects compare favorably with ours at home; gradients and curves are both easy, the country being generally level or but slightly undulating. The locomotives are all of English manufacture, of various types, and approaching the "American" design. The carriages are of the English style, some of them long, with two four-wheel trucks under them. There is a disposition to adopt American ideas, the Engineer-in-Chief, Mr. H. C. Mais, being a liberal-minded, sensible man, disposed to take up whatever appears best adapted to the work, regardless of its origin—differing from some others in this respect.

Tasmania.—The Government has one line with 5 ft. 3 in. gauge about 40 miles long, running from Launceston, a port on the north side of the island, to Deloraine, and then westerly along the north coast. It is well built, laid with heavy double-headed rails, stone ballasted, well cared for. The gradients and curves are heavy. *Business light.* They have six English engines, five with a single leading wheel, and one lately received with a four-wheel Bissell truck.

The Tasmanian Main Line, a private corporation, has a line extending from Launceston to Hobart Town, 133 miles, of 3 ft. 6 in. gauge. The country is hilly, and the line follows the contour of the country. For ten miles out of Launceston the rails are laid on the ties of the Government Railway; they are of H pattern, 40 lbs. per yard; maximum gradients 1 in 40 and curves of 5 chains radius—330 feet. The Government gave a subsidy on the promise of passenger trains running 23½ miles per hour including stops, and you can imagine the lively character of the exercise in passing over the road. There are grades and curves as a rule. In one place for seven miles the ruling gradient is 1 in 40 and there are reverse curves of 330 ft. radius, with no tangent between the two. They have eleven locomotives, originally built with side tanks. Seven of these have 14×20 in. cylinders with 6 wheels (3 ft. diameter) coupled, and a 4-wheel truck; two, 11×18 in. cylinders, four wheels (3 ft. diameter) coupled, and a pony truck; two, American design, cylinders 12×20 in., four driving-wheels, 4 ft. 6 in. diameter. The passenger cars seat ten on each side—about the size and style of our street cars—with wrought wheels Clark's brake is applied to all wheels, worked from the brake van by the guard, who, by the way, is the only person attached to the train, and he "doubles" the road daily.

In New Zealand, railways are commenced and are being constructed in various ports over the two main islands, from the Bluffs and the port of Invercargill, in the extreme south, to Auckland in the north. Some 600 miles are open or nearly ready. The gauge is 3 ft. 6 in. The roads are admirably constructed as a rule, the rails of main lines 52 lbs. per yard, and branch lines 45. The ballast is generally of broken stone; when otherwise, good clean gravel. The gradients are heavy in the hilly country, say 1 in 40, with curves of 330 ft. radius; but on the principal lines 1 in 46 is the heaviest grade and curves of 495 ft. the minimum radius. The locomotives are English, save two Rogers just received. The cars are likewise of English type, but they are adopting the American 4-wheel truck for passenger cars.

In the colonies the following is about the mileage of railways open:

New South Wales	550 miles.
Victoria	900 "
South Australia	400 "
Tasmania	175 "
New Zealand	600 "

I have written this hurriedly while waiting for a steamer to Sydney, so you will excuse the evident disconnected character of the letter.

Accurate Screw-Cutting and Centering.

FORT WAYNE, April 14, 1878.

TO THE EDITOR OF THE RAILROAD GAZETTE:

My attention was drawn to a capital article on threads and screw cutting in your journal of January. It would be well for every apprentice in a machine shop to read it. Sir Joseph Whitworth says most truly when he speaks of the necessity of having perfect screws for slide or screw-cutting lathes, and the advantages of having the screw to fit the nut and coalesce all over from end to end. Some Western shops are unwilling to allow time to have the screw-cutting tool ground exactly to the gauge and set particularly, but prefer to have a man or boy grind the tool for a V thread any way, shove the tool in, and take one or two rough cuts over the bolt, and then dash into it by hand with a chaser, with the spindle of the following head-stock sticking out 5 or 6 in., and not tightened. Of course a man will do a bigger day's work the latter way, and if the screw-cutting tool is not set and ground very particularly it is better to give the bolts a slight touch with a chaser, provided the chaser is cut with a perfect thread. But it is a bad plan to chase a thread too much.

A few words on centering and turning might not be out of place here. The fact is, in many Western shops far too little attention is paid in having the lathe centres all turned to a standard gauge and the centres countersunk to fit exactly and drilled. Some men think it does not pay to centre light work any other way than with a centre-punch, where they do not have cutting-off and centering machines. But this is a most erroneous idea. In my opinion, using punched centres with a centre punch ground on the stone is a barbarous practice. No wonder the dead centre is always in bad order, cutting and squeaking. The fact is, putting good centres in work is of as much importance as the foundation of a house, and every thoroughbred turner that has served an apprenticeship on the right side of 21 knows it. I have seen boys take work to the vise, drive a centre punch into it, take it to the lathe, chalk the full sides, take it back to the vise, draw the centres, and try again; whereas if they would put a square or centre cutting in the spindle of the tail-block or head-stock and push a tool gently against the full side, it would come true in an instant. The main advantage of square centering is the superior quickness over all other methods. I have seen lots of light work from an inch and a quarter down, centered by sticking one end into a hollow V-shaped socket live centre, without putting a dog on one end or stopping the lathe at all. In almost any shop a boy for a few shillings a day could be kept constantly centering and drilling for all the light lathes, and then they would have good, permanent, properly shaped centre or countersinks, and their centres would last for many months. I have seen good centres put in car axles by having the centres turned to the gauge and hardened to the proper temper by being fitted into each end of a wheel press and then pressed to ⅝ or ¾ diameter. The centres are much harder, wear better, and are less liable to cut and squeak than if countersunk with a cutting centre. I have seen hundreds of axles centred in this way, and no perceptible wear on the centres that did the pressing, although in constant use for years. Some men have a great notion of turning wrought iron dry with a very fine feed and quick speed, and then rasping into it with a file. That may do for old, dirty, sandy iron; but I contend that except for very light work a water-cut without filing is the better way and much quicker. A man that can scrape cast iron without chattering or jarring, and does not require files and sandstone, or can finish wrought iron balls, handles, ogees, fillets, bulges and hollows without the use of files has an immense advantage over one who can't. Sir Joseph Whitworth's male and female steel hardened standard templates were in use in Manchester the year I went to the trade, 1842, and probably some years before. They are now very generally used both in England and America. It would be well if link pins, etc., could be fitted up in the same way.

It is seldom anything appears in scientific engineering journals from the pen of a practical workman. But as Sir Walter Scott said there was no man, however ignorant, but you could learn something from, I make bold to try if my endeavor is worth a place in your columns.

A VETERAN.

RAILROAD GAZETTE

Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

THE MASTER MECHANICS' ASSOCIATION.

As the time for holding the annual meeting of this Association is near at hand, it may not be amiss to devote some space to a review of its past career, and to a consideration of its probable future usefulness.

The Association was organized in 1868 at Cleveland, Ohio, by a few of its present members, the object then being simply that of bringing together persons who occupy the positions of superintendents of locomotives on different railroads, for the discussion of questions of mutual interest. Very early in its career the system of appointing committees for investigating and reporting on various subjects was adopted, and it is to this plan, probably, as much as any other cause, that the success of the Association has been due. We have before us the bound volumes of the annual reports, which afford some indication of the work done at the different meetings. These reports have increased in size and in value from year to year, and show that the field in which the Association has been working has extended in proportion as it has been occupied. Still, it must be confessed that there is in these reports a great lack of original research and of systematic methods of investigating the subjects which are discussed. There have been, it is true, some few reports on papers submitted and published which show that the investigations were made with great care and intelligence, but in the majority of them only plain, obvious and somewhat superficial things are said, leaving untouched, in most cases, the main principles which underlie the subjects. It would, however, be very unwise in this, as it is in most other occasions, to regret that the Association is not what it *might be*, and by so doing fail to make it what it *can be*. In order to have an association of master mechanics, its membership must consist of the persons who now occupy such positions, and not of men specially produced and trained for the purpose. When we build houses or railroad cars we use the best timber we can get, and cannot wait for it to grow, or even to season, but are sometimes obliged to use it green because it is the best that can be procured. In an analogous way the material of which associations are formed is often green, and only years of experience will properly season it.

The question for consideration is this, how to make an association of master mechanics, such as they now are, as useful as possible. The interests intrusted to their care are enormously great, and upon their knowledge and good judgment it will largely depend whether the money whose expenditure is made under their direction will be economically or wastefully employed. The kind of knowledge which the master mechanic needs will become apparent if his duties are reviewed, and some clear idea is formed of the responsibilities which he is called upon to assume.

The first duty which he must perform is that of keeping the locomotives on the line on which he is engaged in repair, and in an efficient condition for the service on the road. Now to do this nothing will serve him as well as experience with the working of locomotives. If the flanges of the driving-wheels cut, he should know just where to look for the cause. If the valve gear does not work right, the defect must be found and remedied. If "she don't burn her fire right," the master mechanic must have the instinct to enable him to adjust the exhaust pipes right, or if the smoke-stacks throw too much fire, the proper remedies must be applied. It would be an endless task to enumerate the duties of this kind which he is called upon to perform, a proper knowledge of which can only be acquired by long practical experience, added to which he must or should have a clear head to form sound conclusions. Besides such duties as these, he must have the requisite executive ability to manage the men to advantage, and conduct a large establishment economically. He will be called upon at times to plan shops, select machinery and design structures for various purposes and localities. Upon his knowledge and skill in this respect it will largely depend whether thousands of dollars will be expended so as to yield the full value of the money, or whether the structures will be designed in a blundering way and the machinery such as is very imperfectly suited for the purpose intended. Then, too, there comes a time when new engines must be bought, and the design and proportions must be determined upon by some one who should be competent for the task. If the master mechanic is able to draw up the specifications as they should be, the locomotives bought will be suited to the traffic of the road; if they are badly designed or proportioned, they will be an unprofitable heritage to the company during their whole future existence. Defects in the design of the details will be a source of unending expense, and mistakes in their proportions will make them inefficient and costly in the consumption of fuel. Now it may seem a very simple thing to come to a right decision in such matters, yet ignorance of the theory of the working of locomotives, misapprehension of facts, or fallacious reasoning on them, may lead to errors the cost of which can only be counted by hundreds of thousands of dollars. Where the responsibilities and the pecuniary interests are so great, it is obvious that any knowledge which will indicate how a master mechanic's duties can be more effectively or economically performed will be valuable in proportion to the interests under his control; and although the knowledge may be a very simple fact or theory, yet when applied to expenses which count by thousands the aggregate economy may be very great. Thus on a leading railroad a few years ago the operating expenses were very materially reduced by simply increasing the train-loads of the engines, the reason for this being that the cost for locomotive runners', firemen's and conductors' services is not at all increased if the train consists, for example, of forty instead of thirty cars, and the cost of fuel, oil, waste and repairs is very little if any greater than in proportion to the number of the cars. It is true that the question of repairs is disputed, especially the repairs of cars, but once clearly establish the fact that freight can be hauled at much less cost per car per mile in large trains than in small ones, and the question concerning the cost of repairs, which is now disputed, will then soon reach a solution. The truth is, however, that comparatively few master mechanics realize the fact that the cost of carrying freight is very materially reduced by increasing the size of the trains, and nothing will so impress this fact upon their minds as to hear a thorough discussion of the whole subject in a meeting similar to those which are annually held by their own Association. It was stated last year at the convention in St. Louis, by several members, that they had been using paraffine as a lubricant with very great success. This question is also still disputed, especially by the dealers in oil; but if it is a fact that this cheaper quality of oil can be used in place of the more expensive varieties, it is a fact the knowledge of which to any company could readily be calculated, with a very close approximation to accuracy, from the oil accounts or charges for any given period. The special cases which we have cited are of course isolated ones; there are hundreds of others concerning which a master mechanic is likely to get information by attending the annual conventions of the association. The scope of these is indicated by the subjects submitted to committees for reports this year. These are: 1, Best form and material for locomotive wheels and axles and also the best methods of counterbalancing; 2, Lubricants; 3, Locomotive boilers; 4, Long runs; 5, Locomotive tests.

Besides these subjects it is probable that the plan adopted last year, of setting apart a certain hour each day for receiving and discussing questions, will be followed this year, so that the range of topics which will be presented is very wide, and in a sense unlimited. Besides, as we have taken occasion heretofore to say, the informal and unreported discussions which take place in the halls and corridors of hotels, and when there are no restrictions of parliamentary rules, is perhaps more useful and profitable than the regular proceedings of the Association "in convention assembled."

It is not unusual to hear complaints of the associations, on the ground that "they never decide anything," and some of those who make such complaints seem to think that the office of the Association should be to sit gravely upon certain mechanical subjects and issue a sort of bull, either approving or condemning the matter at issue. It does not seem to occur to such persons that so long as the Association has no authority to enforce such edicts they would be futile, and that the effect would be no different from that of the resolution of a member who proposed at the close of one of the conventions that a resolution be passed that "we all go home, and that each member, when he gets there, do as he pleases." Whatever conclusions or recommendations are adopted, the effect would be just as nugatory as the one suggested, unless the Association should be endowed with an amount of authority which it is not likely to have. The direction in which it now appears that it may be most useful is to so shape its proceedings as to elicit the fullest discussion, and lead members to give their experience and also, if possible, to awaken their interest in different subjects, so as to induce them to observe and record and report various matters which pertain to their occupation and daily duties. In this way the annual meetings of the Association may become, and, it is believed, have become a powerful mental tonic, their effect being to awaken those who attend them from the mental lethargy into which we are all prone to fall unless stimulated in some way.

There can be no doubt but that within the last two or three years the interest in the Association has declined somewhat. The meetings do not present the charm of novelty which they once did. The reports have most of them followed in the same beaten track as those of previous years, and there have not been wanting plenty of scornful persons who were ready to declare that the meetings "do not amount to nothing." Now, while this is not true in the sense in which it is sometimes stated, it is true that the interest in the late meetings, especially the last one, indicated a decline from previous years. This was due partly to two causes: one from which the Association has suffered a number of times before—we refer to the noisiness of the hall. A meeting held under such circumstances becomes simply a dumb show, and the interest in the proceedings is almost as effectually suppressed under these conditions as though a stream of cold water from a hydrant was turned on the audience. It is to be hoped that the committee in Richmond will this year secure a room which will be quiet.

Another mistake that is made, is the idea that when the meetings are held there is a certain amount of business to be "pushed through." The proceedings are thus hurried along, discussion is suppressed, interest flags, and the assembling together goes for nothing, or at least not for profit.

There is nothing so fatal to an association as the creation of a feeling among its members that their contributions to its proceedings are not hospitably received, and few of us are so devoid of vanity as not to feel complimented when we are invited to take part in the labors of a committee, the discussion of a report, or to submit a "paper." Whatever can be done, therefore, to lead those who are able to contribute useful information should be employed, and an invitation from the Chairman, or a request from the Secretary, will often bring a member to his feet who otherwise would be too modest to let his light shine.

It is expected that the attendance of master mechanics from the Southern states will be more general than

ever before, and Richmond was specially selected as the place of meeting with that object in view. The attendance, it is thought, will be greater than at any previous meeting, and as there is an absence of any exciting topics, probably the Association will devote itself exclusively to its legitimate and most profitable work. If it does this, it will do more to regain the interest in its proceedings which has been lost than is possible in any other way.

THE CHICAGO, MILWAUKEE & ST. PAUL.

This company has a great system of roads with, on on the whole, a light traffic. It owns absolutely 1,413 miles of road distributed among many different lines in Wisconsin, Minnesota, Iowa and Illinois, and some of these lines have a large traffic—the largest that exists in Wisconsin, probably. But taking the system as a whole, the traffic of 1877 was only equivalent to 54½ passengers and 265 tons of freight each way daily over the whole mileage, which was actually carried by an average of 1.63 passenger trains and something less than 3.04 freight trains each way daily. Something less, we say, for the report of freight train mileage includes switching, which is a large proportion of the whole.

This is a lighter traffic than most of the roads from Chicago westward have; the Chicago & Northwestern, which is in many respects similarly situated, has about one-fifth more trains per mile, and an average traffic for the last year reported of 80 passengers and 332½ tons of freight—that is, its passenger traffic was 50 per cent. and its freight traffic 25 per cent. heavier than the Milwaukee & St. Paul's. The latter is a road, too, on which traffic has not grown very rapidly of late years. For the five years that the company has worked substantially the same amount of road (1,399 to 1,403 miles), this traffic has been:

	Passenger miles.	Ton miles.
1873	52,252,528	257,638,532
1874	58,260,429	259,168,288
1875	54,880,848	272,539,502
1876	59,845,665	284,808,027
1877	55,925,449	271,598,133
Average	56,232,984	265,150,496

Thus last year the passenger traffic was but 7 per cent. and the freight traffic but 5½ per cent. greater than in 1873; while the average for the five years is a little greater in passenger traffic and but 2.4 per cent. less in freight traffic than in 1877. As the western lines of this company are on "the border," where most of the country is still unoccupied and uncultivated, this slowness of progress is more to be feared than on a road wholly in a country already fully occupied, like Wisconsin and Illinois, not to say more Eastern States; and indeed in this case it would be decidedly discouraging but for certain circumstances which have had a very great effect in preventing the settlement and ordinary increase in production of the new country which this road reaches.

Before 1873 even, immigration to Minnesota had been checked. The chief cause, apparently, was the opening of great and fertile tracts of country in milder climates at low prices by railroad companies which made great exertions to secure settlers. At the same time the growth of Iowa was checked, more, apparently, because the government and other very low-priced land there was pretty much all taken than for any preference for the states of Kansas and Nebraska, which received most of the immigration. But after that year those parts of Minnesota where there is most cheap land, and also a part of Iowa reached by the Chicago, Milwaukee & St. Paul, were visited by the plague of locusts, which not only greatly reduced the production of the districts so visited, but almost put a stop to immigration. We should not estimate the effect on immigration by the average suffering of these states from this calamity. Only a corner of Iowa was visited, and that the least settled and cultivated part; and the average production per acre of cultivated land in the state was probably very little reduced by these pests. In Minnesota the invasion covered a much larger territory, and included a few counties where a large amount of land was under cultivation, and the production of that State was materially reduced thereby. But though the locusts did not trouble most of the well-settled parts of Minnesota, they abounded in nearly all parts where there are large amounts of very cheap and fertile lands—that is, in just those parts of the state where, under ordinary circumstances, settlers chose to go. And the deterring influence of such a plague extends beyond the limits of the districts which actually suffer. The immigrant fears lest the next year's invasion may reach further eastward and desolate counties that have heretofore escaped. Both Minnesota and Northwestern Iowa, then, have had their growth very greatly checked, in many parts almost totally arrested, by a calamity which seems now to have finally passed, the locusts having done very little damage last year, and in Minnesota not preventing the maturing of the greatest crop the state has ever known. And it seems to have taken but this one favorable year to restore confidence fully; and already immigration to Minnesota since the last harvest has been greater than for several years before, and probably greater than ever before.

This explanation is no more than is due to a fair understanding of the position of the Chicago, Milwaukee & St. Paul and other railroads with lines in Minnesota and Northwestern Iowa. They are by no means unprogressive lines. Their light traffic has not only room to grow, but a trustworthy basis for growth in the large and fertile districts yet to be developed for which they must serve as outlets unless more trunk lines are built—of which there is now no prospect. The arrest of growth has been due to exceptional and temporary causes, which seem to have finally ceased to operate, and, as the experience of a few months past has shown, growth has actually begun, and that at a rapid rate.

Now, however, the traffic of the road, as we have said, is light. Fortunately for the company, however, it has something else light, and that is its capital account. The system of roads which it owns is represented by a comparatively small issue of stock and bonds, and it requires only very moderate profits per mile of road to make up its fixed charges for yearly interest and a balance for a dividend. All told, the stock and bonds are at the rate of less than $41,000 per mile of road owned, and it represents besides an investment in a controlling interest in the shares of the Western Union Railroad—an investment, however, which seems never to have made any returns, though it secures to the Chicago, Milwaukee & St. Paul a short haul on a certain amount of Western Union through traffic. Indeed, for the past seven years, the net earnings of the Western Union have but just about equalled the interest on its bonds, and as, like other roads, it has required some expenditures for new construction, it has doubtless proved a source of expense instead of income to the Chicago, Milwaukee & St. Paul. Apparently, however, it has now reached at least a self-supporting stage, as the net earnings for the past four years have somewhat exceeded the yearly interest. It is safer, in estimating the value of the Milwaukee & St. Paul property, not to count this investment of a million and a half as a valuable asset; but it need not be counted as a burden, as so many investments of railroad companies virtually are.

The funded debt of this company is at the rate of $21,214 per mile, the interest on which in 1877 amounted to $1,527. Now for a series of years the gross and net earnings per mile of road have been:

Year.	Gross.	Net.	Year.	Gross.	Net.
1873	$7,109	$1,752	1876	$5,753	$2,215
1874	6,400	2,203	1877	5,784	2,548
1875	5,897	2,204			

If we considered gross earnings only, we would certainly look upon this as a property of decreasing value, as we have heretofore seen that it has been one of very slowly increasing traffic. But a glance at the column of net earnings shows precisely the contrary progress. The profits have grown all the time that the earnings were decreasing, though for three years, it is true, the increase was so very small that the profits may well be called stationary for that time. The contrast between the course of gross earnings and that of net earnings is certainly very striking. From 1873 gross earnings decreased 19 per cent., and at the same time net earnings increased 45½ per cent. There have been many cases since 1873 where a reduction of expenses has more than equalled a reduction in receipts, but we remember none in which the difference was so marked in the course of receipts and profits.

It will also be noted that every year since 1873 there has been a margin of profits over the interest charge equal to about 50 per cent. of the present amount of interest, which is larger than formerly. Last year, which was by no means a specially favorable one for the traffic of this company, the margin over the yearly interest was nearly 70 per cent. of the latter, and at the rate of 5.2 per cent. on all the stock, both common and preferred.

We have said that the year 1877 "was by no means a specially favorable one for the traffic of this road." It was in fact, partly extremely favorable and partly extremely unfavorable. The first half was probably the worst in the history of the road; the last half, or, more strictly, the last four or five months, was doubtless the best, or the best since 1873. This road depends very largely upon the wheat crop of Wisconsin and Minnesota. In those States that crop is perhaps more certain than anywhere else in the country. A failure was hardly known until the crop of 1876, which was extremely light. Two very bad crops in succession have never been known, we believe. Thus, ordinarily, the report for the calender year will not include more than half of a very bad year, and when the other half is a very good year, as in 1877, the whole may be a fair average. Thus we see that in 1877 the gross earnings were a trifle greater than in 1876, while the contrast between the first half and second half of the year, as noted in the report, was very great, as below:

	1877.	1876.
First half	$2,958,153	$3,000,517
Second half	5,156,741	4,093,654
Total	$8,114,894	$8,054,171

In 1876 the earnings were pretty evenly divided between the first and the second half of the year; in 1877, 63½ per cent. of the whole were made in the last half of the year.

The prospects of this road for the current year are certainly brilliant. Not only is it profiting by the great wheat harvest of last year, but also by a very heavy immigration traffic to Minnesota, such as has not been seen for years. Then not only is a heavy traffic secured to it for the first half of 1878 by the great harvest of 1877, but there is every prospect that there will be at least as large a crop to be marketed in the last half of the year. Estimating crops at this time of the year is often very much like counting chickens before they are hatched; but this is less true of wheat than of many other crops, and the extremely early season for seeding and the good condition in which the crop has been started increase materially the chances of a good yield, while the enormously increased area sown estimated carefully and in much detail at considerably more than one-third in Wisconsin, Minnesota and Northern Iowa, will give a very large total production even if the yield per acre is considerably lower than the average.

The immediate future of this company, therefore, is very promising. With its light capital account it can pay good dividends from moderate earnings. If the earnings should keep up throughout the year 1878, at the rate of those of the last half of 1877, they would amount in gross to about $10,000,000, of which probably 40 to 45 per cent. would be net, or equivalent to 7 to 8½ per cent. on both classes of stock.

NEW YORK GRAIN ROUTES.

In our general investigation of the grain traffic of the country, having in previous weeks discussed the course of receipts and exports at the five leading Atlantic ports, we now come to the business of New York city. In what has been said of the receipts and exports of the five Atlantic ports, we have seen sufficiently the relative position of New York as a receiver and exporter of grain, and the course of both movements at that city. And it is important to remember that this New York grain business has been a growing business; that from 1866 to 1877, as shown by Diagram 2, published April 7, except in two instances, the receipts of any one year were greater than those of any previous year; and, in spite of the considerable fluctuations in the total exportable surplus, its exports showed an almost uninterrupted increase until after 1874, and its considerable decrease in 1875 was chiefly due to a decrease in total exports. It is not a falling-off in quantity, but in its proportion of the total quantity that has been remarked. The complaint of New York merchants is not so much that their grain business has grown smaller as that it has not grown larger so fast as that of some of their rivals, especially those in Philadelphia and Baltimore. In what follows, however, we are not so much interested in the grain business of New York as in the routes by which it receives grain and their relative business. We compare railroads with canal, and one railroad with another. Here again we only continue the work begun last year (March 2, 1877, page 98).

Diagram 5 represents the receipts at New York precisely as the receipts and exports of the five Atlantic ports were represented by Diagrams 1 and 3. In Diagram 5, however, each of the small rectangles into which a rectangle for the total receipts of a year is divided represents the receipts by a single route. The routes are named in the first and last years, and are, reading from the top down:

"Coastwise" (vessels bringing grain or flour from points on the Atlantic coast).

"Hudson River" (nearly all boats from the Erie Canal).

"New York Central & Hudson River" Railroad.

"Erie" Railway.

A very narrow space including the receipts by all railroads other than the three named, forming a quantity too small to give room for name or figures in the diagram.

"Pennsylvania" Railroad.

The receipts coastwise and by Hudson River being put together at the top, the part below the Hudson River rectangle shows the total rail receipts.

The changes shown in Diagram 5 are very great and

numerous. Beginning with the line between rail and water receipts, we see how, after 1870, the proportion of rail receipts increased constantly, making an ascending staircase on the diagram, until last year, when, for the first time since 1871, a downward step is taken, and a much longer one than any upward step has been, bringing down the proportion of rail receipts to less than it was as far back as 1873, and a little less than the average of the past eight years. The proportions received by each route for the past eight years are given also in the following table, in which the full-faced figures illustrate what we have just said as to the course of rail and water receipts :

YEAR.	Pa. R. R....	Erie.....	N. Y. Cen...	Total rail...	Hudson River..	Coastwise.	Total water.
1870.....	10.2	19.5	15.3	**46.1**	49.5	4.4	**53.9**
1871.....	8.4	20.5	9.0	**38.5**	58.6	2.9	**61.5**
1872.....	10.0	20.5	10.9	**41.8**	55.5	2.7	**58.2**
1873.....	10.8	24.2	15.5	**51.0**	47.6	1.4	**49.0**
1874.....	11.4	20.6	21.2	**53.7**	44.0	2.3	**46.3**
1875.....	9.3	23.5	24.3	**57.6**	40.3	2.1	**42.4**
1876	9.3	21.0	30.8	**61.5**	34.4	4.1	**38.5**
1877.....	6.3	15.3	26.8	**49.3**	46.8	3.9	**50.7**
Average.....	9.5	20.6	19.2	**50.0**—	47.1	2.9	**50.0**+

But something else is shown by these figures and this diagram. The advance in rail receipts has been due to a single one of the three railroads—to the New York Central & Hudson River—the others having little more than held their own down to 1877, when they decreased their averages, while the New York Central increased its. Below is a table showing *quantities* and not percentages for the same routes and the same years, the figures standing for millions of bushels:

YEAR.	Pa. R. R....	Erie.....	N. Y. Cen...	Total rail...	Hudson River..	Coastwise..	Total water.
1870.....	7.2	13.6	10.7	**32.3**	34.8	3.1	**37.9**
1871.....	7.6	18.4	8.0	**34.5**	52.5	2.6	**55.1**
1872.....	9.1	18.8	9.8	**38.1**	50.7	2.5	**53.2**
1873.....	9.7	21.8	14.0	**48.0**	42.8	1.3	**44.1**
1874.....	12.3	22.0	22.7	**57.7**	47.3	2.4	**49.7**
1875.....	8.7	22.1	22.8	**54.1**	37.9	2.0	**39.9**
1876.....	8.9	20.1	29.6	**59.0**	33.0	3.9	**36.9**
1877.....	7.1	15.8	27.7	**50.8**	48.4	4.1	**52.5**
Total.....	70.6	152.6	145.3	**374.5**	347.4	21.9	**369.3**
Average.....	8.8	19.2	18.2	**46.8**	43.4	2.8	**46.2**

This table should be examined in connection with Diagram 6, which shows the course of rail, water and total receipts, and of total exports, at New York, for eight years.

From these we see that on the average for the past eight years New York has received about the same amount (a trifle more) of grain by rail as by water. Since 1872 it has received more by rail, until last year, when the water receipts were, compared with 1876, increased by 42 per cent. and the rail receipts decreased by 14 per cent. The amount received by rail in 1877 was the smallest for four years.

Let us now observe the receipts by the separate routes. Looking back to 1870, we find that the three principal railroads were not very far apart, the Erie taking the first rank with 13,600,000 bushels, the New York Central following with 10,700,000, and the Pennsylvania coming in behind with 7,200,000 bushels. Following the course of the last-named road, we find its deliveries increasing gradually and reaching their maximum in 1874, since which time they have decreased faster than they had increased, and in 1877 were a little less than in 1870.

The receipts by the Erie in 1870 were 13,600,000 bushels, nearly twice as great as those by the Pennsylvania, and they have followed very closely, but on a larger scale, the course of the Pennsylvania receipts—that is, they increased at first, and latterly have decreased materially. Erie receipts very nearly reached their maximum in 1873, and then remained nearly stationary for three years. But the receipts which stood at 22,100,000 bushels in 1875 fell to 15,800,000 in 1877.

The receipts by the New York Central are in striking contrast to those of the other two roads. They fell instead of rising from 1870 to 1871, and in the latter year were but 8,000,000 bushels, very little more than the Pennsylvania's, not half the Erie's, and but 9 per cent. of the total receipts of New York. But after 1871 they grew more rapidly than those of any other road or any other route. It was not until 1874, however, that they equaled the Erie's receipts, and in 1875 they did not greatly exceed them. In 1876 they exceeded not only the Erie's receipts, but those of all the other roads put together, and though, like those of the other roads, they decreased from 1876 to 1877, the decrease was much less in proportion than that of any other road, and still left the receipts by the New York Central much larger than in any year previous to 1876, and a fifth larger than the total receipts by the other roads. This is very rapid progress. Delivering but 8,000,000 bushels at New York in 1871, in 1877 the New York Central delivered 27,700,000 bushels there. In 1871 New York was indebted to it for one-eleventh of its total receipts (9 per cent.), in 1877 for more than a quarter of them (26.8 per cent.); and this in spite of the decrease from 1876 to 1877.

The reversal of the positions of the Erie and the New York Central is quite remarkable. During the first four of the eight years for which we give figures, the Erie brought 72,600,000 bushels to New York, and the New York Central 42,500,000; during the last four years the New York Central has brought 102,800,000 bushels and the Erie 80,000,000. The Erie has a little more than held its own in quantities carried; the New York Central has increased its business 140 per cent.

Turning now to the canal receipts, or receipts by Hudson River as they are entitled on the diagrams, considerable fluctuations are shown in amounts (very nearly parallel with the line of "Water receipts" in Diagram 6), but from 1871 to 1876 a constant decrease in the proportions, as is clearly shown in Diagram 5, where the height of the rectangle for "Hudson River" becomes less and less until last year. Then, however, the proportion increases enormously, so much so as to become nearly equal to that of 1873.

This great and sudden increase, reversing the tendency of the six years previous, has been almost universally ascribed to a reduction of the canal tolls, amounting to about one cent per bushel on wheat and corn. Of course everything which makes the cost by one route in any degree lower than that by other routes tends to increase the traffic by the cheaper route; and there can be no doubt that the Erie Canal traffic increased in 1877 chiefly because that year it was much the cheapest route most of the time while the grain movement was heavy. But, as we have explained repeatedly, only a small part of the actual difference between rail and water rates in favor of the canal route last year was due to the reduction in tolls. By far the larger part was due to an advance in rail rates. The rates received by canal boats on by far the larger part of the grain carried by them in 1877 were much higher than in 1876, in spite of the reduction of tolls. But the advance in rail rates was still greater. Last year's experience showed that with a rail rate of 30 cents per 100 lbs. from Chicago to New York, the canals can get most of the business, and that at remunerative rates; but it did not show that this would be the case with the rail rate at 20 cents or less, as in 1876, or even at 25 cents, as is the case now. In 1876, the lake vessels and canal boats were required to meet a rail rate of 12 cents a bushel from Chicago to New York, and the canal boats had to pay 2 cents per bushel for toll. In 1877 they had only to meet rail rates of 18, 21 and 24 cents, and paid 1 cent for toll. Evidently the advance of six cents or more in rail rates had much more to do with the diversion of grain from the railroads to the canal, than the reduction of one cent in canal expenses. The reduction aided; there is no question as to that—that is, it made it easier for the canal boats to get the business, and left their owners larger profits; but it alone would not have been sufficient. If the rail rates of 1876 had been continued throughout 1877, there can hardly be any doubt that the canal shipments would have increased very little, if at all, and that there would have been little or no profit on the shipments, in spite of the reduction in tolls.

In Diagram 5 we have divided the receipts of each year by a perpendicular dotted line. The parts on the left of the line represents the exports of the year. These, it will be seen, have varied greatly. The other part, which is not always the smallest, has varied comparatively little for many years. It amounts to about 40,000,000 bushels, and represents, apparently, the consumption of the city and of the other places in this country which receive their supplies from New York. This is comparatively a constant quantity, being very little affected by the competition of other ports. In itself it is a very large amount, and not much less than the total rail receipts. But while it is a business for which other cities cannot compete effectively, it is as much subject to the competition of the different routes to New York as the grain exported.

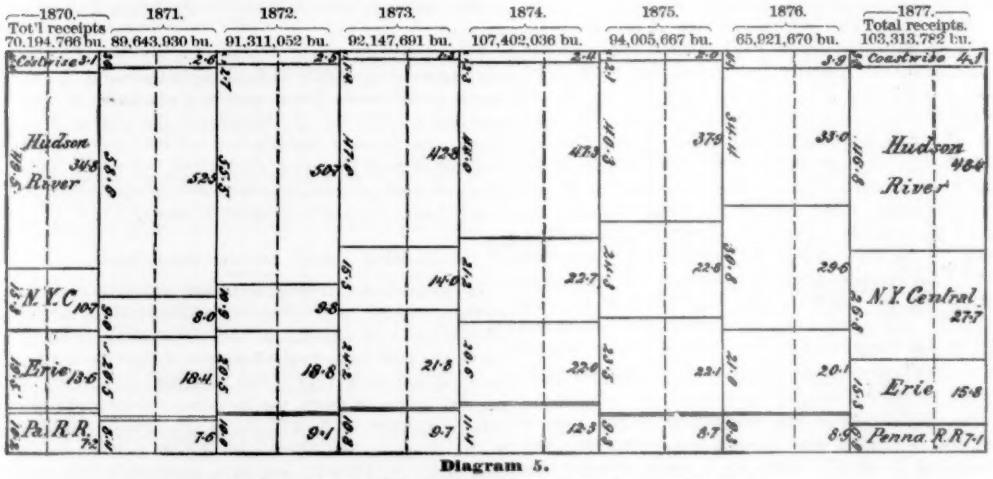

Diagram 5.

Receipts of Grain at New York by Different Routes for Eight Years.

The parallelograms of equal height represent the receipts of the years named over them. Each of the small rectangles into which these larger parallelograms are divided represents the receipts by a single route. The figures on the *right* of such a rectangle represent the millions of bushels, and those to the left the percentage of total New York receipts arriving by that route.

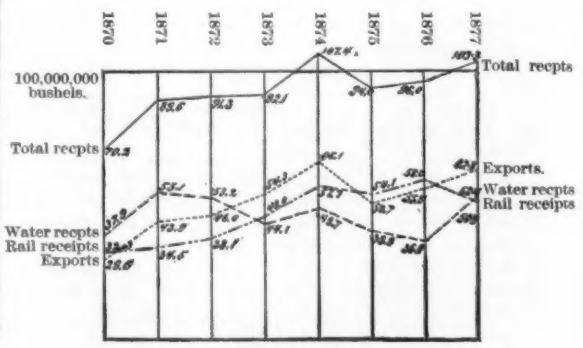

Diagram 6.

Course of Grain Receipts and Exports at New York.

[The figures at the intersections represent millions of bushels.]

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Longview & Sabine Valley.—Extended south 6 miles to a point 10 miles from Longview, Tex. It is of 3 ft gauge.

Springfield, Jackson & Pomeroy.—Extended southeast to Greenfield, O., 9 miles. It is of 3 ft. gauge.

This is a total of 15 miles of new railroad, making 257½ miles completed in the United States in 1878, against 232 miles reported for the corresponding period in 1877.

THE LATEST RAILROAD WAR is that now raging between the Chicago and St. Louis railroads for the business of Missouri River points below Omaha, being the business recently divided by the late Southwestern Rate Association, to which all the contending parties belonged. This is a contest between markets as well as one between railroads, which makes it the bitterer; as the railroad companies are continually urged on by the merchants of the respective markets. The Chicago or St. Louis merchant proclaims war to the knife and no quarter, knowing that the fighting will be done and the blood shed not by him in any case, but by the Chicago and St. Louis railroads, whose losses he can bear philosophically, seeing that they contribute to his profits. The whole contest seems to be as to the proportions of business that shall go by the different markets, St. Louis and Chicago being the chief contending cities, but the other markets receiving by way of Hannibal (chiefly Toledo) also taking part. It seems that the allotment to St. Louis by the Southwestern Rate Association was unsatisfactory to it; and it is quite possible such allotment was an objectionable one. The St. Louis roads are said to have had offered them much more than the share allotted them during

the winter, when lake navigation was closed and considerable shipments were made by the Mississippi River. But when navigation is open, especially if lake and canal rates are very low and rail rates are well maintained, the condition of things is likely to be reversed, the Chicago roads receiving more than their proportion. The trade is an important one, but more by reason of its rapid growth than because of its present bulk, being chiefly Kansas grain, and Texas, Colorado and Kansas live stock. By the latest advices the rates had fallen to 7 cents per 100 lbs. from Kansas City to Chicago, and 5 cents to St. Louis, on the lowest class, which includes pretty much all the eastward shipments, and to corresponding rates on westward shipments, which are chiefly lumber and merchandise. The distance to Chicago is about half the distance from Chicago to New York; to St. Louis, about one-third of such distance, which gives a good basis for comparison. This makes the Kansas City rate equivalent to a 14-cent fourth class rate from Chicago to New York, which is, we think, lower than any on record, in the bitterest war. The Chicago roads are acting together, and apparently are disposed to bring the contest to a speedy end if hard fighting can do it. They are by far the strongest companies, financially, but that may not help them any. It is more in their favor that the Missouri River business forms but a small proportion of their total business, so that carrying it for nothing for a few weeks or months may not embarrass them materially. Meanwhile the Kansas farmer for the time is substantially removed to Eastern Illinois, the freight on his grain to Chicago, nearly 500 miles, being no more than is usually charged for 50 miles. The probable effect on him, however, will be that he will be inclined to insist on terms equally favorable to him and ruinous to the railroads for ever after. The blood shed in railroad wars is the best of fertilizers for Granger laws.

THE WINTER GRAIN MOVEMENT for the eighteen weeks from Dec. 1 to April 6 has been for the past five years as follows: The receipts of the eight principal Northwestern markets have been in bushels:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
49,581,471	35,879,926	40,893,954	28,319,845	45,495,068

This winter's receipts are 38 per cent. larger than last winter's and 9 per cent. greater than those of 1873-74, which hitherto have been the largest ever known.

The shipments of the same eight markets for the same time have been:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
34,674,320	18,570,906	22,296,646	14,668,748	21,190,826

The shipments this year are 87 per cent. greater than those of last year and 55 per cent. greater than those of any previous year. The shipments this year, however, alone of the five, include some lake shipments, amounting for the six days' navigation was open to 1,332,000 bushels. This early opening of navigation will affect Northwestern shipments largely and Northwestern receipts somewhat hereafter; for the Northwest, indeed, the "winter movement" has already ended this year, and we continue the statements only to cover the winter seasons or seasons of closed navigation, of the other years.

The receipts of the seven Atlantic ports for the same eighteen weeks have been:

1877-78.	1876-77.	1875-76.	1874-75.	1873-74.
62,831,537	33,283,254	32,260,991	18,057,570	33,832,589

The receipts this year are 88½ per cent. greater than last year and 87 per cent. greater than ever before.

The opening of navigation will not affect the seaboard receipts until about the last week of April, the canal not having opened until the 15th, and the boats requiring considerable time to get through.

A PIPE LINE BILL has passed both houses of the New York Legislature and is now in the hands of the Governor for his approval or veto. The bill seems to have been advocated more in the interest of localities than of oil producers: that is, the latter do not appear to have interested themselves greatly in favor of the bill. The chief pressure for it was from Buffalo. It seems to be thought that with a pipe line to Buffalo that place might be made a great refining centre, and could utilize the canal for the shipment of the produce, if a pipe line should not be extended to the seaboard. The chief objection to the bill was made on account of doubts expressed as to the constitutionality of granting the right of eminent domain to a corporation which carries only one kind of goods. The assumption seems to have been that he only is a common carrier who carries all kinds of objects, while the real signification is one who carries for the public —for all alike—it being this which makes him a common carrier, a common servant to the whole public for the trade which he exercises, which may be carrying passengers alone, or freight alone, or a special kind of freight alone, or all alike. If this right were not granted, probably it would be impossible for any corporation to secure the right of way to the seaboard, except the existing railroads, which already have it. A railroad line would probably not be the cheapest route for a pipe line, which is not so limited by grades and curves as a railroad, but it would be in many respects advantageous for such a line; and if this means of transportation to the seaboard is finally adopted, it may very well be that some of the lines will follow the general routes of existing railroads, and very likely be owned by them. The transfer of the oil traffic to the canal would be a pure addition to the canal traffic, and would require a special stock of boats.

LAKE AND RAIL RATES on both east-bound and west bound freight were to be the object of negotiations at a meeting held in Cleveland last Wednesday, too late for us to learn the results. This is a matter in which the immediate connections of the trunk lines, that is, the railroads from Buffalo and Pittsburgh to Chicago and Milwaukee, have a great interest, as the difference allowed between the all-rail and the lake-and-rail rates may very greatly limit the amount of traffic received by these roads. The propellers running in connection with the New York Central & Hudson River, the Erie and the Philadelphia & Erie roads make good time, and generally give good satisfaction for those freights which do not suffer by handling, and with a considerable difference in rates in their favor they can get a large share of the traffic—not simply of flour, grain and provisions from the West, but also of merchandise—even first-class freight—from the East. There has been heretofore an agreed difference in the west-bound rates in connection with the New York apportionment, but it was not satisfactory to all parties, and there is now to be an endeavor to establish differences in both directions.

LAKE RATES have advanced a little since navigation opened, contrary to all precedent. The last reported rates from Buffalo to Chicago were 3¼ cents per bushel for wheat and 2¾ to 3 cents for corn, against 3 and 2½ cents at the opening. There is said to be just now a scarcity of vessels, owing partly to a number being still locked up in Lake Ontario, the Welland Canal not having been opened. On the other hand, the railroads between Chicago and Buffalo have been indulging a little in cheap transportation on their own private account to such a degree that one would suppose that there would be no chance for an advance in lake rates. Five cents per 100 lbs. for grain, which is equivalent to 3 cents per bushel on wheat, is said to have been accepted in some cases; and this is not the result of any contest, but simply of a free, open and honest competition for traffic, with good-will to competitors and no complaints against them. The reductions are confined to Buffalo consignments, and do not extend to through shipments; but they cannot long continue without affecting through shipments. They are not likely to be continued, however, all parties being desirous of advancing them, and none having any grievance.

THE OPENING CANAL RATES were 6 cents for wheat, 5½ for oats and 3⅜ for oats from Buffalo to New York, against 7½, 6½ and 5 in last year. Last year, however, the rates fell in a very few days to 6¼ for wheat and 5½ for corn, and before the end of June 4¼ cents was the rate on corn, there being very little wheat to move.

The General Superintendent's Department on English Railroads.

The office of *General Superintendent*, or *Superintendent of the Line*, as it is variously styled, is one of the most responsible in the gift of a Board of Directors. He has the most expensive plant under his charge, and the lives of the traveling public in his control. Even when surrounded by highly competent assistants, a conscientious man in administering that high office must feel an ever-present dread of possible catastrophe from a thousand and one causes. It may seem a simple matter to the man who looks at a time-table that, even in the case of the most complicated systems, those who have been trained to the work should be able to construct one, and so, no doubt, it is; but, when that has been most carefully arranged, and due margin has been left for contingency, active though not nominal responsibility passes from the officers to the working staff—station masters, conductors, guards, engine-drivers, stokers, pointsmen, signalmen, crossing-keepers, goods and mineral drivers and brakesmen, workmen in charge of the permanent way—every one of these has the power of stultifying the most perfect arrangements for working over the line, and rendering them abortive, if not disastrous. Shakespeare represents Henry IV. as exclaiming in his distress, "Uneasy lies the head that wears a crown." There are few of our general superintendents who are free from a similar uneasiness, though the crown they wear be but the bays they earn for their capacity. How many of them can leave the cares of office locked up in their bureaux when they retire to the quiet of their firesides, and the merry prattle of their children? Does not every ring of the door-bell suggest possible calamity, and a call to scenes of dire disaster? Who among them can avoid the thought, as he lies down to well-earned sleep, that the midnight mail train, whose progress from point to point has been so carefully calculated, or the express goods train, whose shunts to clear the line for its more rapid neighbor have been arranged so accurately, may not *to-night*, from some slight overlook, one thoughtless act, one moment's want of watchfulness, plunge unsuspecting souls into instant and irrevocable death? This dreadful thought, we say, *must* sometimes visit the most able and conscientious of our superintendents; and, visiting them amid the happy influences of home, will doubtless imbue them with a finer sensibility to the dangers to which the splendid fellows who plunge through midnight darkness, flashing past myriad unseen risks, on engine foot-plates, or in luggage-piled brake-vans, are subject, and will help to produce that fine *esprit de corps* between officer and servant which should always subsist in our service, and through means of which the best work will certainly be done.

The *General Superintendent* is responsible, as we have said, for the safe conduct of all traffic on the line. He drafts the time-table—goods and mineral trains being arranged subject to his approval; he compiles the book of "Rules and Regulations" for the working of the traffic; has the charge of, and supreme control over, station masters, porters, pointsmen, signalmen, crossing-keepers and guards, and, with the exception of a very few of the higher class of station masters, he has, most generally, the appointment of the whole staff of his department. On some of the more important lines he has district officers with delegated powers, and is then relieved of much of the detail of the work; but on all lines he is the undisputed chief administrator over the line staff. To his office everybody reports upon everything. He must be fully informed of all that transpires in working the line. Guards send in their train journals, station masters their complaints, and their reports upon casualties of all kinds, and upon claims made for detention or loss, together with suggestions as to train arrangements, increase of accommodation, etc. Inspectors report the result of investigation into the complaints we have just referred to, of their inspection of signal boxes, and the working of signals, points, etc.; of the working of trains, and especially of the manipulation of excursion and other extraordinary traffic. The company's police apprise him of their movements for the detection and punishment of offenders against the letter of the eighth commandment and of the company's by-laws. The audit office advises of all cases of incapacity or carelessness in the keeping of station accounts, or the result of special investigation, where fraud or default is suspected or discovered. The telegraph brings the first faint echo of breakdown, collision or other obstruction of the line, and the post or next mail train bears confirmation, and gives form and substance to the report by fullness of detail. The uninitiated can form no fair conception of the *quantity* of sheets of writing paper, foolscap, tea paper—the latter used by guards in writing up their train journals, and by inspectors, pointsmen, signalmen and often station masters—all this necessary reporting to the superintendent's office implies, or, of its *bulk*, when it all lies open upon his assistant's desk for distribution, morning, noon and rosy afternoon, as it comes in by every train. Its bulk, and often its greatest troublesomeness, is mightily increased by the necessary correspondence with other companies. Indeed, so great is the *volume* of this delivery of paper, all day and every day, at the superintendent's office, that it almost invariably falls to the duty of one member of the staff to divide it among the departments as it comes in, each department having a distinctive mark as a reference. While routine work is carried forward in the departments without reference to the superintendent direct, there are always a great many subjects with which the superintendent alone can deal. In the course of the day, therefore, apart from the necessary consultation with general manager, goods manager, locomotive superintendent, engineer, secretary or solicitor, the general superintendent has frequently more than enough to occupy him in dealing with specially knotty questions. He can usually keep a confidential short-hand clerk writing constantly to dictation; his grasp of subjects, each of which is diverse, being, in the case of really capable men, perfected by the habit of concentration of thought and attention upon what is *immediately present*. If he travels, he cannot leave this ever-pressing correspondence behind him, or his deputy, with limited authority, is in difficulty as to what to do with it. He therefore carries his short-hand clerk and his papers and his note-book with him on his journeys, and, while fellow-travelers are conning the day's news, skimming the latest novel, or comfortably napping in a corner, this busy officer is reading, and pondering, and dictating, while the clerk is practicing the difficult art of writing legible shorthand in an express train at full speed. So thoroughly hemmed in is the Superintendent with walls of reports and endless correspondence, and so constantly interrupted when busiest by an inquiring public, that we can scarcely wonder if he seeks his holiday recreation—short-lived and unfrequent as it too often is—among Scottish, Irish or Welsh mountain solitudes, where post, carrier, newsman and telegraph boy are alike unknown.

The Superintendent must be often from home visiting his stations. Notwithstanding his staff of intelligent and active inspectors, ever at his disposal to get at the whole facts of a difficult case, and the fullness of detail of reports prepared for him, a conscientious and energetic superintendent will feel the moral advantage of station visiting. He will feel that if this duty is performed in a kindly spirit his visits will be regarded as complimentary to the station master's skill in management, or his care and orderliness in his arrangements. If station discipline is harsh, he hears of it, and can reduce chaotic elements to at least comparative harmony. If discipline is loose, he cannot fail to see it, and his periodical or incidental visits will prove to be beneficial checks. An observant officer will always travel with his eyes and ears open, and will often learn more in the course of a single glance along a platform while his train halts, or in a casual remark among fellow passengers, of the character of the service given to the public, than he could ever hope to glean from reams of correspondence. By the exercise of this same faculty of observation he will also satisfy himself as to whether due prominence, in the most accessible places, is given to the company's time bills, and whether the *latest* are duly posted. He will often find it necessary to make incidental halts at stations for personal investigation of causes of complaint—the public *versus* the station master, or the station master *versus* some member of his staff—in cases where the statements made in writing to the office are conflicting. In addition to these he always holds a court of inquiry on the spot into the causes of accidents or casualties. These inquiries are usually made with the assistance and coöperation of the locomotive superintendent, and the permanent way engineer, and in certain cases the goods manager and mineral superintendent lend the aid of their counsels. The results of such inquiries are usually reported to the general manager, and are private and confidential. There is besides, however, a class of accidents into which the Board of Trade order investigation, and their inspector is sent down for that purpose. The superintendent has, on such occasions, to accompany the inspector to the scene, and to produce all who were in any way concerned in the accident, or who can throw any clear light upon its causes.

Subject to the approval of the general manager, the superintendent arranges all train runnings, both as to speed and stoppage, their working from main to branch lines, and *vice versa*, the goods manager conferring with and advising him as to goods and mineral train changes. He compiles the time tables and posters and has charge of their distribution among the staff and the companies, and where through booking, and continuous train working with competitors, or more friendly companies, exist, he must consider and consult these before fixing hours of arrival or departure. He has, further, the arrangement of rates and fares, precisely the same rules guiding him to which we made reference in treating of the goods manager. For purely *local* traffic his company's special acts alone limit his powers; but, wherever other companies are interested they have to be consulted and the Clearing House sanction obtained. On some of the more extensive systems there is an officer, comparatively independent, to whom the distribution of carriage plant is intrusted; but the duty is frequently left to the superintendent. Where the latter is the practice the work he has to oversee is greatly increased.

The general superintendent is a member of the Superintendents' Conference which sits quarterly, in the Clearing House, Seymour street, London, or, in the case of Irish railways, in Kildare street, Dublin. He has his company's vote on all questions under discussion. As a rule he goes up to these conferences unattended; but, in his absence, he is represented by an assistant, usually his chief rates and fares clerk. When questions of detail on a large scale arise, such as the alteration of groups of stations, there is generally a meeting of these chief rates clerks summoned for the Clearing House rooms, or some other convenient centre, and the details fully and freely discussed and minuted for the next Superintendents' Conference, where further discussion ensues and a decision is taken. At the conference meetings the superintendent exercises his sole legislative function.

This is, mayhap, a rapid and incomplete sketch of the general superintendent; but who shall peruse it and ponder the variety of the work he has to superintend, and its engrossing responsibility, and not feel that the office cannot be held efficiently by a man without wit and culture, who is also accustomed to be firm, with suavity? The control of such an army, with its linked inter-dependence, implies the need of much and competent assistance. Accordingly a general superintendent's office will be found to embrace, as a rule, a

duly qualified deputy, and such a variety of departmental clerks as there are important functions to be performed by the chief. And, firstly, let us glance at the office of deputy—he is too often only chief clerk. Being in charge of an office into which reports and correspondence pour incessantly, he must be a man of energy, physical and mental, ready in resource, quick to apprehend, with force of character to enable him to decide promptly, and the fullness of knowledge which is needed to prevent that "repentance at leisure" which sometimes follows hasty decision. *He* is the administrator in the office, and must be apt in his administration—like his chief, gaining respect for his exercise of authority by its simple justice and its manifest humanity. He will often require to decide upon questions outside the office, to arbitrate in difficulties along the line, and that upon written information. He has reputation at stake in these cases also, and a good and true man will seek to do his duty in that on the strictest principles of justice without fear or favoritism. There is a high function to be fulfilled by all in authority, in this respect, which lies at the very root of all wholesome management. The stern rebuke of a really just and humane man tell with infinite force on *all* dispositions. The deputy must be a strict disciplinarian, with this in view, for he has a large staff under his control, and efficient service will be won or lost according as he has tact, or wants it. He must be conversant with all the details of office work, so that he may be able to advise and instruct. Next to these high qualifications, he ought to be fairly cultured, and possessed of some native parts; as he should give tone and style to the correspondence issuing from the office, sending back for correction or re-writing whatever is offensive to good taste. It may be urged that in a correspondence so voluminous it is idle to look for the grace of style and the higher courtesies; but we maintain that to the cultured it is as easy to be gracious as the reverse is to be boorish; and we are desirous of holding up this view to the rising generation all the more that this is an age of cheap and effective intellectual drill. If the deputy is a man of the right stamp, he will know how to meet the public when they come with complaints, or to make inquiry. Some knowledge of what is needed in the construction of time-tables, and the arrangement of special trains, is indispensable, and also an acquaintance with the principles on which rates and fares are calculated. He should also keep a look-out upon the department having oversight of the running of trains, so that he may direct attention to the improvement of some, and suggest the discontinuance of others. His capacity as deputy will be best illustrated in relieving his chief of all matters with which he can honestly and rightly deal, and in drawing up sufficiently succinct *precis* of everything upon which the superintendent's opinion and instructions may be necessary to be taken. It should be his province so to manage that the superintendent shall have time to devote to the more active duties of his office; and, if he is a really competent lieutenant, he should have plenary powers. The chief rates clerk, for the due discharge of *his* office, should be well read in the geography of the railway system, and have an accurate knowledge of his company's powers, and of the Clearing House rules. He will be supplied with the Clearing House minutes from time to time, the details of which it will be his business to master, while he will find it advantageous to inform himself of the terms of agreement between his company and their competing neighbors. His books should always be kept so closely up, by the careful and prompt posting up of changes, that "he may read who runs." Indeed, in all railway offices no rule is more wholesome than this. The claims clerk should be chosen for a judicial quality of mind, not one who would too readily yield and pay, but one who, seeing that difficulties increase, by preventible delay, should have prescience to yield ere it be too late to effect compromise. The task in this department is not surrounded with such difficulties as in the goods department. It is, however, sufficiently onerous to call for skillful manipulation. The most serious of all claims in the passenger superintendent's hands are thosemade for compensation for personal injury. Of these we shall, however, have something to say in a subsequent and separate paper. The time-table department is a most important division of the superintendent's office work. The superintendent or his deputy indicates that certain trains are to come off or to be put on. Trains go in pairs, one up and one down, each corresponding with the other. If an up train is discovered to be running unremuneratively, it cannot be interfered with unless a down train can be dispensed with also, as the engines and carriages must *return*. It is accordingly no easy task so to arrange that the maximum of work may be got out of the engine and carriages with the minimum of working expense. That, however, must enter into the calculation of the superintendent and of his time-table clerk. When the weather or time of year are not offering inducements to travelers, traffic by passenger trains is light. These purely temporary incidents cannot, however, afford to affect the efficiency of a good staff of guards, whose services will soon again be in full requisition. So, when trains are discontinued for a time, these men are drafted off to some other duty, to be ready, at call, to assume their old places. In the matter of merely changing the times of departure and arrival of trains the superintendent simply indicates the leading times, and leaves the passing and stopping times to be calculated by the time-table clerk. The duty of finishing and printing these fresh monthly or incidental time tables is very onerous, the safety of the line being dependent upon their accuracy. The severest critics of the time tables are the drivers and guards—whose experience of running is so thoroughly practical. If the alteration ordered or contemplated meets with their approval it may be said that its success is ensured. The time-table department has also the preparation of time tables for all special traffic, special goods, mineral and passenger trains, and in the case of all such, separate slips have to be issued "to all concerned." The issue of time tables and posters is a very important matter, and involves much experience, tact and care. The chief companies, besides serving copies upon every man concerned—even the platelayers requiring to be supplied — are in the habit of sending them out to all hotels in the country, to steamship proprietors and also to each other. The chief clerk of such a department must, therefore, be a painstaking, careful man—methodical in habit—and his assistants equally so. The men upon whom devolves the work of examining the train journals as they are delivered —and guards and brakesmen are expected to make them out and deliver them as soon after they reach the end of each double journey—must also be careful and smart. The chief object of examining these is to ascertain whether trains are keeping time, and the causes of obstruction, and to endeavor to arrange for improved working. These are the principal departments into which the superintendent's staff is divided. The main body of the clerks must be accurate, swift, and neat penmen. They should be fairly educated; the higher and broader and more liberal their education, the better fitted are they for promotion, and the more useful in their several spheres. A knowledge of shorthand is now almost indispensable in the office of the superintendent, and, as we have said, it is easily acquired, where it is unknown. No novice is now engaged who is not in some degree familiar with its signs.—*The Railway Sheet (London).*

Transportation in Congress.

In the Senate on the 15th:

Mr. Windom, of Minnesota, called up the Senate bill to authorize the construction of a narrow-gauge railroad from Bismarck to the Black Hills. The bill gives the right of way through the public lands, as mentioned at length when the bill was reported from the Committee on Railroads on the 29th of March last. Several amendments were agreed to, and the bill was read a third time and passed. Subsequently Mr. Eaton, of Connecticut, entered a motion to reconsider the vote by which the bill was passed.

Mr. Teller, of Colorado, called up the Senate bill to incorporate the National Pacific Railroad and Telegraph Company, reported by the Committee on Railroads on the 28th of March last. It grants the right of way through the public lands from Cheyenne or Pine Bluff to Fort Laramie; thence to a point at or near Deadwood; thence from some point on the line of the North Platte River, in a northerly or northwesterly direction, to the Yellowstone River, near the mouth of the Big Horn River; thence by the most practicable route to a point at or near Helena, Montana, thence to tidewater at Portland, Oregon.

Mr. McDonald, of Indiana, moved to amend the bill so as to grant the right of way to the western boundary of Montana, instead of to tidewater at Portland, Oregon, and said he did not think Congress had the power to grant the right of way for a railroad through a state.

The amendment was agreed to.

Several amendments were submitted and, pending discussion, the further consideration of the bill was postponed until the next day.

In the Senate on the 16th:

The Windom bill for the extension of the time for the completion of the Northern Pacific Railroad was reported back from the Committee on Public Lands and referred to the Committee on Railroads, which has charge of the Mitchell bill. Notice was given that the friends of the rival bills had agreed upon a compromise bill, which would be acceptable to both parties.

The Committee on Railroads afterward reported favorably the compromise bill. Placed on the calendar.

Consideration of the bill to incorporate the National Pacific Railroad & Telegraph Company (Cheyenne via Helena, Montana to Portland, Oregon), was resumed, an amendment providing that the road should not have the right of way through any Indian land was agreed to, and the bill was then passed by a vote of 39 to 9.

Mr. Eaton withdrew his motion to reconsider the vote by which the Bismarck & Black Hills Railroad bill was passed on Monday.

In the House on the 17th:

Mr. Rice, of Massachusetts, from the Pacific Railroad Committee, reported back the bill extending the time for the completion of the Northern Pacific Railroad. Referred to the Committee of the Whole.

Mr. Morrison, of Illinois, presented the minority report.

Mr. House, of Tennessee, of the same committee, reported back the bill amending the various Texas Pacific Railroad acts. Referred to the Committee of the Whole.

Mr. Blair, of New Hampshire, and Mr. Morrison presented minority reports.

Mr. Rice, of Massachusetts, from the same committee, reported back the bill establishing a board of Pacific Railroad Commissioners. Referred to the Committee of the Whole, and made the special order for May 15.

Mr. Throckmorton, of Texas, chairman of the committee, reported back the bill to survey the Austin & Topolovampo Pacific routes. Referred to the Committee of the Whole.

Mr. Chalmers, of Mississippi, from the same committee, reported back the bill amending the various Pacific Railroad acts. He stated that it was identical with the Thurman Sinking Fund bill. Referred to the Committee of the Whole.

Mr. Blair, of New Hampshire, from the same committee, reported back the bill to facilitate the sale and settlement of public lands granted to aid in the construction of railroad lines. Referred to the Committee of the Whole.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Missouri, Kansas & Texas, annual meeting, at the office in Parsons, Kan., May 15, at 1 p. m.

Pittsburgh, Fort Wayne & Chicago, annual meeting, at the office, No. 175 Wood street, Pittsburgh, May 15, at noon.

Atchison, Topeka & Santa Fe, annual meeting, at the office in Topeka, Kan., May 16, at 3 p. m.

South Carolina, special meeting of holders of second and non-mortgage bonds, at the Bank of Charleston, in Charleston, S. C., April 24, at noon.

Central Vermont, annual meeting, at the office in St. Albans, Vt., May 15, at noon.

Railroad Conventions.

The *Car Accountants' Association* will hold its third annual meeting at the Fifth Avenue Hotel, New York, beginning Friday, April 26. Members are notified that the meeting will be called to order at *ten o'clock, sharp.*

The eleventh annual convention of the *Master Mechanics' Association* will be held in Richmond, Va., beginning Tuesday, May 14.

The fifth annual meeting of the *Purchasing Agents' Association* will be held in New York, beginning Tuesday, May 21.

The twelfth annual meeting of the *Master Car-Builders' Association*, will be held at Niagara Falls, N. Y., beginning Wednesday, June 12.

General Time Convention.

The General Time Convention met in the Windsor Hotel, New York, April 10, with 47 delegates present, representing 31 lines. Mr. E. S. Flint, of the Cleveland, Columbus, Cincinnati & Indianapolis, presided, and Mr. W. F. Allen, of the *Official Guide*, was Secretary. A committee consisting of the Chairman (Mr. Flint) and Messrs. E. S. Bowen, Frank Thompson, J. Tillinghast, J. D. Layng, Charles Paine, D. W. Caldwell, R. Andrews, George H. Heafford, D. W. C. Rowland, P. D. Cooper, J. E. Simpson, Charles Stiff, R. S. Stevens and C. O. Russell was appointed to prepare the time-sheet.

After a recess the committee reported, recommending that the same general time be adopted as now in force, with the exception that the St. Louis express, 6 p. m. from New York, will arrive in St. Louis one hour earlier than formerly. This was adopted and ordered to take effect May 12.

The convention then adjourned, to meet at the Grand Pacific hotel in Chicago, Oct. 10.

Southern Time Convention.

A meeting of Southern lines was held in Richmond, April 17, to consider the time schedule between New York and Southern points. Mr. H. F. Kenney, of the Philadelphia, Wilmington & Baltimore, presided, and Mr. W. F. Allen was Secretary. A committee of 13 was appointed to revise the time-sheet and reported that it was not advisable to make any change at present. After some discussion this report was adopted, and the convention adjourned, to meet in New York, Oct. 13.

General Passenger & Ticket Agents' Association.

At the called meeting held in Cincinnati, April 4, which was briefly noted last week, the subject of emigrant rates was considered. A resolution providing for emigrant and land-buyers' tickets at two cents a mile had several amendments offered, and the following adopted as a substitute:

That from and after April 15, 1878, all one way single land or colonist tickets shall be abolished, and that round trip tickets (of the iron-clad form) shall be issued to such points as may be designated by land-grant roads west of their eastern termini, at a rate of not less than 2½ cents per mile, each way, based on short-line mileage, up to connecting point of land-grant roads, and that the rate on land-grant roads shall not exceed such rate per mile.

The following resolutions were also adopted:

Resolved, That emigrant tickets, limited to three days, from Buffalo, Dunkirk, Salamanca, Pittsburgh and Wheeling, and points west thereof where excursion tickets are sold, may be placed on sale from and to similar paints, at one-half rates named for excursion tickets, except from such eastern points as the seaboard emigrant rate shall be less than one-half the excursion rate; in which cases such emigrant limited tickets may be sold at similar rates as emigrant tickets are sold from points east of those named above. Such special rates to extend westward until they meet the one-half rate of excursion tickets.

Resolved, That no special excursion trains be advertised to carry colonists westward.

The meeting also adopted a schedule of rates, reported by a committee, from various interior points to Emporia, Ellis, Kinsley and Baxter Springs in Kansas, Lincoln and Columbus in Nebraska.

PERSONAL.

—The marriage of L. M. Johnson, formerly of the Keokuk & Des Moines road, now General Manager of the Cairo & St. Louis, to Miss Helen W. Stewart of Chicago, is announced to take place at the residence of the bride's father, Hart L. Stewart, No. 1,175 Prairie avenue, in that city, on the evening of April 22.

—Mr. John E. Lyon, a well-known citizen and merchant of Boston, and for a long time President of the Boston, Concord & Montreal Company, was burned to death on the night of April 11. He was stopping overnight at the Pemigewasset House in Plymouth, N. H., and feeling unwell he got out of bed during the night, and, while crossing the room, fell to the floor. A lamp, which he carried, broke and set fire to his clothing, burning him so severely that he died in a short time. Mr. Lyon was never married ; he leaves a considerable property, a large part of which is invested in his road.

—Capt. Joseph H. Smith has resigned his position as General Southern Agent of the Louisville & Nashville road, and will keep a hotel at Artesia, Miss.

—Superintendent Heywood, of the Fitchburg Railroad, has offered the use of his beautiful country place in Acton, Mass., for the months of July and August to the Boston Home for Little Wanderers.

—Mr. Bayard Butler has resigned his position as Treasurer of the Pennsylvania Railroad Company, on account of ill health. The board, in accepting Mr. Butler's resignation, caused to be entered on its minutes its appreciation of the faithfulness and ability he had always shown in fulfilling the various duties devolving upon him during the 23 years he has passed in the service of the company.

—Wm. M. Tweed died in Ludlow Street Jail in New York, April 12. The history of the notorious "Boss Tweed" is too widely known for him to require much mention here, but it may be noted that he was for several years a director of the Erie Railway Company during the period of the Fisk-Tammany alliance, when both Fisk and Tweed were at the height of their power.

—Mr. Robert Mardin, Master Mechanic of the Peoria, Pekin & Jacksonville road, recently had one hand caught in some machinery at the Jacksonville shops and badly crushed.

—Mr. Daniel Atwood has resigned his position as General Freight and Ticket Agent of the Green Bay & Minnesota Railroad.

—The resignation of Hon. Chester W. Chapin as President of the Boston & Albany has been accepted by the board, and he retires from the position ofter 24 years of continuous service, having been first chosen President of the Western Railroad Company in 1854. He has been a director since 1850, and still remains in the board.

—Nearly ten years ago, Thomas M. Tyng brought suit to recover $330,000 from the Baldwin Locomotive Works for commissions claimed by him while agent for the company. The case was allowed to sleep until the referee originally appointed died. A new referee was appointed who has just reported that the claim is supported only by Mr. Tyng's own evidence, while there is a mass of testimony against it. He finds that there is nothing due Tyng, but that he owes the company $5,106 for commissions paid him by dealers.

ELECTIONS AND APPOINTMENTS.

American Society of Civil Engineers.—The January *Transactions* notes the following additions to the Society:

Members: C. Frank Allen, Assistant Engineer Newton Water Works, Boston; Charles P. Gilbert, Civil Assistant Engineer, United States Engineer Office, Detroit, Mich.; Edward Marseland, Marine Engineer, Sing Sing, N. Y.

Junior: Ira E. Clark, City Engineer's office, Cambridge, Mass.

Attleboro Branch.—This company has reëlected H. F. Barrows President; J. R. Brownson, Clerk; H. N. Daggett, Treasurer.

Boston & Albany.—Mr. D. Waldo Lincoln, of Worcester, Mass., has been chosen President in place of Hon. Chester W. Chapin, resigned. Mr. Lincoln has been Vice-President for several years.

Central, of Iowa.—The United States Circuit Court has appointed Maj. Henry L. Morrill Receiver, in place of J. B. Grinnell, resigned. Mr. Morrill has been for some time Superintendent of the Minneapolis & St. Louis road.

Chicago & Atlantic.—At a meeting held April 9 directors were chosen as follows: Samuel F. Atwater, John Dulville, A. B. Kile, Robert Rae, Alfred Thompson, Edward Walker, S. N. Yeomans.

Cincinnati, Lafayette & Chicago.—Mr. A. J. Chandler has been appointed Auditor.

Cleveland, Tuscarawas Valley & Wheeling.—Mr. Oscar Townsend, of Cleveland, O., is appointed General Manager, in place of Mr. E. B. Thomas, who has gone to the Cleveland, Columbus, Cincinnati & Indianapolis.

Columbus & Hocking Valley.—At the annual meeting in Columbus, O., April 9, the old board was reëlected, as follows: M. M. Greene, Wm. G. Deshler, Henry C. Noble, B. S. Brown, P. W. Huntington, W. B. Brooks, Isaac Eberly, C. P. L. Butler, H. W. Jaeger, John L. Gill, John D. Martin, C. H. Rippey, S. W. Pickering.

Green Bay & Minnesota.—At the annual meeting in Green Bay, Wis., April 1 the following directors were chosen: Henry Ketchum, New London, Wis.; D. M. Kelly, Green Bay, Wis.; John I. Blair, Blairstown, N. J.; Benjamin G. Clark, Jersey City, N. J; Wm. E. Dodge, Moses Taylor, Percy R. Pyne, Edwin F. Hatfield, Jr., New York. Messrs. Ketchum, Kelly and Hatfield are the only members of the old board reëlected.

Havana, Rantoul & Eastern.—The following officers have been reëlected: President, Lewis Steward, Plano, Ill.; Vice-President and General Manager, B. J. Gifford; Chief Engineer and General Superintendent, A. W. Wright; Secretary, G. D. Penfield; Treasurer, M. C. Dewey.

International & Great Northern.—At the annual meeting in Palestine, Tex., April 3, the old board was reëlected as follows: Samuel Sloan, Moses Taylor, John S. Barnes, T. W. Pearsall, of New York; R. S. Hays, H. M. Hoxie, D. S. H. Smith, Ira H. Evans, James A. Baker, of Texas. The board reëlected Samuel Sloan, President; R. S. Hays, Vice-President; D. S. H. Smith, Treasurer; Ira H. Evans, Secretary; Jacob Wetmore, Assistant Secretary.

Minneapolis & St. Louis.—Mr. Charles F. Hatch is appointed General Manager. Mr. Hatch was formerly General Superintendent of the Lake Shore & Michigan Southern, and more lately General Manager of the Eastern Railroad, and is esteemed an exceptionally capable official.

Mobile & Ohio.—Mr. S. H. Edgar has been appointed Auditor, the appointment taking effect April 1.

The Southern Division, now extending from Mobile, Ala., to Tupelo, Miss., is under the immediate charge of Assistant General Superintendent C. Fleming. The Northern Division, from Tupelo to Columbus, Ky., is under the charge of Superintendent E. S. Hosford.

Pennsylvania.—Mr. John D. Taylor has been chosen Treasurer in place of Bayard Butler, resigned. Mr. Taylor has been Acting Treasurer for some time, in consequence of Mr. Butler's illness.

South Carolina.—At the annual election in Charleston, April 10, the following directors were chosen: Wm. J. Magrath, Lewis D. de Saussure, Andrew Simmonds, Francis J. Pelzer, Wm. A. Courtenay, J. B. E. Sloan, Wm. L. Trenholm, John Hanckel, George W. Williams, R. W. Cubbedge, James S. Gibbes, J. P. Southern, Henry Gourdin, Moses Taylor, Samuel Sloan. The board reëlected Wm. J. Magrath President.

Wilmington, Columbia & Augusta.—The United States Circuit Court has appointed Mr. R. R. Bridgers (President of the company) Receiver, on application of the bondholders.

TRAFFIC AND EARNINGS.

Grain Movement.

Receipts and shipments for the week ending April 6 were, in bushels:

	1878.	1877.	Increase.	P. c.
Northwestern receipts	4,022,086	1,711,939	2,310,147	135.1
" shipments	3,836,491	1,574,082	2,262,409	143.8
Atlantic receipts	4,609,220	1,420,795	3,188,425	225.2

This week, this year for the first time, shipments were made by lake from Northwestern ports. The rail shipments, however, were 65 per cent, of the total. The seaboard receipts are the largest since last October. Of these, 42.2 arrived at New York, 22.3 at Philadelphia, 18.9 at Baltimore, 8.8 at Boston, 6.4 at New Orleans, and 1.4 at Portland.

Coal Movement.

Coal tonnages for the week ending April 6 are reported as follows:

	1878.	1877.	Decrease.	P. c.
Anthracite	297,336	400,806	103,470	25.8
Semi-bituminous	64,232	82,863	18,631	22.5
Bituminous, Pennsylv'a.	34,741	35,557	816	2.3

The coal tonnage of the Pennsylvania Railroad for the three months ending March 31 was:

	1878.	1877.	Inc. or Dec.	P. c.
Anthracite	122,453	145,121	D. 22,668	15.6
Semi-bituminous	332,727	409,032	D. 76,305	18.7
Bituminous	381,124	418,089	D. 36,965	8.8
Coke	241,081	239,552	I. 1,529	0.6
Total	1,077,385	1,211,794	D. 134,409	11.1

The decrease is chiefly in Broad Top and Clearfield and in gas coals.

At the monthly meeting of the Coal Board in Philadelphia, April 16, it was decided to fix the production for May at 1,305,000 tons, or 180,000 tons more than for April. This will make the total production for the first five months of the year about 2,500,000 tons less than last year. The assignment for May gives the Philadelphia & Reading 500,000 tons; Lehigh Valley, 200,000; New Jersey Central, 175,000; Delaware, Lackawanna & Western, 150,000; Pennsylvania Railroad, 105,000; Delaware & Hudson Canal Company, 100,000; Pennsylvania Coal Company, 75,000.

East-Bound Freight Rates.

The tariff of April 1 was modified April 8 by putting promiscuous and some other freight into the fourth class, which is a reduction from 30 to 25 cents per 100 lbs. from Chicago to New York. The articles included are beef, pork, hams, shoulders, lard, tallow, lard oil, stearine and grease, in barrels, tierces and boxes; fertilizers, green hides, oil cake, malt and mill feed. Salted meat, in bulk, is charged 5 cents more per 100 lbs. To Pittsburgh, Buffalo, Suspension Bridge, and Salamanca the rate on these freights is 18 cents; to Albany, Troy and Schenectady, 20 cents.

Iowa to Liverpool by New Orleans.

The Davenport (Ia.) *Gazette* of April 6 says: "Yesterday the grain firm of Boatwright, Fernald & Co., in this city, sold 5,000 bushels of wheat to an agent of J. W. Adams & Co., of St. Louis, for direct shipment from this port to Liverpool. This quantity does not go alone, for another 5,000 bushels was picked up from among several other grain dealers. The 10,000 bushels is to be loaded on a barge, towed to St. Louis, where it will be put with a tow of five barges, and so be taken to New Orleans, and transferred to an ocean vessel bound for Liverpool. What is the freight rate from Davenport to Liverpool? Why, just 40 cents per hundred pounds; the same rate of grain by railroad from Davenport to New York City! Though now and then wheat will be taken from this city to New York, by rail, for 35 cents per 100 pounds. But think of wheat conveyed from this city to Liverpool for only five cents more than the rail rate to New York harbor! Who can estimate the value of the Mississippi route to the sea and Europe, to Iowa and the Northwest, with that facility of transportation and that tariff to Liverpool! Why, we'll have New York prices right here at home for wheat and corn, with such a state of things, before long, provided the railroads leading to the Mississippi give a reasonable rate to the great river. Davenport prospers as a grain market."

Chicago and Missouri River Rates.

A dispatch from Chicago, April 11, says: "Another material reduction on freight from Chicago to Missouri River points has been made by the Chicago roads, going into effect to-morrow. The new rates are: For first class, 45 cents; second class, 35 cents; third class, 25 cents; fourth class, 20 cents; and special class, 15 cents per hundred weight. Freight rates on Missouri River freight for Chicago are reduced to 10 cents per hundred weight."

Railroad Earnings.

Earnings for various periods are reported as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Year ending Dec. 31:				
Gal., Har. & San Antonio	$1,052,568	.....	.....	...
Expenses	360,205	.....	.....	....
Net earnings	692,263	.....	.....	....
Earn. per mile	5,036	.....	.....	....
P. c. of expenses	34.22	.....	.....	....
Han. & St. Joseph	$1,931,365	.....	.....	....
Expenses	1,135,886	.....	.....	....
Net earnings	$795,479	.....	.....	....
Earnings per mile	6,525	.....	.....	....
P. c. of expenses	58.81	.....	.....	...
South Carolina	$1,020,664	$1,126,437	D. $105,773	9.4
Expenses	593,753	647,753	D. 54,000	8.3
Net earnings	$426,911	$478,684	D. $51,773	10.8
Earnings per mile	4,218	4,656	D. 438	9.4
P. c. of expenses	58.15	57.51	I. 0.64	1.1
Year ending March 31:	1877-78.	1876-77.		
Georgia	$1,203,023	$1,143,128	I $59,895	5.2
Earnings per mile	5,208	4,949	I. 259	5.2
Three Months ending March 31:	1878.	1877.		
Central Pacific	$3,323,410	$3,361,159	D. $37,749	1.1
Dakota Southern	47,630	30,571	I. 17,059	55.7
Denver & Rio Gr.	179,448	131,259	I. 48,189	36.7
Int. & Gt. Northern	348,518	422,723	D. 74,205	17.6
Missouri, Kansas & Texas	634,693	719,846	D. 85,153	11.8
St. L., Alton & T. H., Belleville line	112,594	131,609	D. 19,015	14.4
Two months ending Feb. 28:				
At., Miss. & Ohio	$260,472	$247,976	I. $12,496	5.0
Net earnings	76,681	72,032	I. 4,649	4.5
P. c. of expenses	70.69	71.52	D. 0.83	1.2
Chicago & Alton	601,260	676,655	D 75,395	11.1
Net earnings	234,582	238,008	D. 3,426	1.4
P. c. of expenses	61.01	64.80	D. 3.79	5.8
Clev., Mt. Vernon & Delaware	56,368	52,145	I. 4,223	8.1
Net earnings	10,862	6,500	I. 4,362	67.1
P. c. of expenses	80.68	87.78	D. 7 10	8.1
Dakota Southern	30,662	17,964	I. 12,698	70.6
Net earnings	17,331	.....	.....	....
P. c. of expenses	43.42	.....	.....	....
Kansas Pacific	362,451	357,359	I. 5,092	1.4
Net earnings	85,642	125,539	D. 39,897	31.8
P. c. of expenses	76.36	64.90	I. 11.46	17.7
Nashville, Chatta. & St. Louis	333,577	298,960	I. 34,617	11.6
Net earnings	142,170	125,566	I. 16,604	13.2
P. c. of expenses	57.31	58.00	D. 0.69	1.2
Paducah & Memphis	34,161	30,618	I. 3,543	11.6
Net earnings	10,159	5,969	I. 4,190	69.8
P. c. of expenses	70.50	80.55	D. 9.96	12.4
St. Paul & Sioux City	81,808	60,006	I. 21,802	36.3
Net earnings	31,280	11,105	I. 20,175	181.7
P. c. of expenses	61.77	81.50	D. 19.73	21.7
Sioux City & St. Paul	54,135	33,076	I. 21,059	63.6
Net earnings	20,778	2,187	I. 18,591	850.4
P. c. of expenses	61.77	93.60	D. 31.83	34.0
Southern Minnesota	121,775	67,565	I. 54,210	80.2
Net earnings	68,283	19,622	I. 48,661	248.0
P. c. of expenses	43.85	70.92	D. 27.07	38.2
Union Pacific	1,557,302	1,666,454	D. 109,152	6.5
Net earnings	864,574	1,015,031	D. 150,457	14.8
P. c. of expenses	44.49	39.10	I. 5.39	13.8
Month of March:				
Central Pacific	$1,224,410	$1,245,373	D. 20,963	1.7
Dakota Southern	16,968	12,607	I. 4,361	34.6
Denver & R. Grande	64,257	49,219	I. 15,038	30.6
International & Gt. Northern	103,084	112,037	D. 8,953	8.0
Intercolonial	110,063	80,508	I. 30,155	37.5
Minne. & St. Louis	31,520	.....	.....	....
Missouri, Kansas & Texas	236,546	247,505	D. 10,959	4.4
St. L., Alton & T. H. Belleville Line	37,744	43,450	D. 5,706	13.1
First Week in April:				
Denver & R. Grande	$15,749	$12,254	I. $3,495	27.4
Ohio & Miss., Main L.	64,444	54,842	I. 9,602	17.5
Springfield Div.	8,824	6,915	I. 1,909	27.7
St. L., I. Mt. & So.	78,000	73,103	I. 4,897	6.7
Week ending April 6:				
Grand Trunk	$173,876	$171,087	I. $2,789	1.6

THE SCRAP HEAP.

Railroad Manufactures.

The County Commissioners have awarded the contract for the superstructure of seven bridges, to be built this season, to the Morse Bridge Co., of Youngstown, O. The bid was in lump, at $6,590.39. The bridges embrace a total length of 451 feet, and are to be wrought-iron trusses. They are located as follows: Over Bull Creek, near Tarentum; over Chartiers Creek, at Bridgeville; over Deer Creek, at Kaufman's; over Robinson Run, at Oakdale; over Turtle Creek, at Brinton; over Pine Creek, at Coal Valley, and over Wiley's Run, near Elizabeth. The masonry has not been let. The bids ranged from $2.35 to $3.47 per perch.—*Pittsburgh Telegraph.*

At a recent meeting of the creditors of the Etna Iron Works, at Ironton, O., they recommended that the company make an assignment. The assets are about $500,000, the liabilities about $795,000.

The Cleveland (O.) *Trade Review* says: "A new car-axle box containing an improved device for oiling the journals of the axles of railroad cars, has been patented by Messrs. W. H. & E. C. Burden, of this city. The invention consists of the combination, with a journal and oil receptacle in an axle box, of a friction roller or rollers and an oil guard mounted on sliding bearings supported by springs. The use of cotton waste or similar material is dispensed with and the escape of oil prevented."

As an indication of a probable increase in railroad construction, the Revolving Scraper Co., of Columbus, O., reports an increasing number of inquiries from contractors for the prices of its revolving scrapers and contractors' plows.

The Gilbert Elevated Railroad Company has decided to adopt Hall's system of automatic electric block signals. They are to be ready to work about June 15.

The Keystone Bridge Co., of Pittsburgh, has an order for five iron bridges on the line of the Pittsburgh, Cincinnati & St. Louis road.

Morgan, Williams & Co., at Alliance, O., are making a 2½ ton steam hammer for the Rock Island Arsenal. They have also an order for machinery from the Barney & Smith Manufacturing Co., including three special steam hammers.

A wrought-iron truss bridge of 300 feet span is soon to be shipped from Paterson, N. J., to Hayti, having been ordered by the Government of that country. The bridge is for highway travel, has a 24 ft. roadway, and is proportioned for a load of 2,000 lbs. per running foot. It was designed by Mr. Charles O. Brown, Engineer of the Passaic Rolling Mill Co.; the iron was made by that company, and the fitting done at the Danforth Locomotive Works.

Work in the locomotive department of the Philadelphia & Reading shops is very brisk and about 400 men are employed. Six new locomotives are in course of construction, and about 20 old ones are undergoing repairs. Four of the new locomotives are to be six-wheelers, with Mr. Wootten's improved fire-boxes for burning slack coal. A new eight-wheel freight engine, with connected wheels, and no truck, will be finished next week, ready for trial on the road, and a new passenger engine will be turned out in two weeks.

The Baltimore & Potomac Railroad Co. has put a set of Toucey & Buchanan's interlocking switches and signals in operation at Fulton Junction in Baltimore, the junction with the Western Maryland road.

James Ward, senior member of the late firm of James Ward & Co., of Niles, O., iron and coal operators, filed a voluntary petition in bankruptcy April 12. The firm made an assignment two years ago, and it was then thought that all the creditors would be paid, but the assets have decreased so much in value that very little is left, while there are still liabilities amounting to $1,606,000.

The Rogers Locomotive Works, at Pattorson, N. J., have an order for several locomotives for a Western road.

The Chicago Timber & Bridge Co. has filed articles of incorporation in Illinois to build bridges, docks and similar structures. Capital, $30,000; incorporators, Wm. W. Bell, James Brown, G. W. Ledlie.

The new steel furnaces and rail mill of the Roane Iron Co., at Chattanooga, Tenn., are nearly finished. The works will begin making steel about May 1, and expect to turn out the first steel rails early in June.

The Missouri Valley Bridge Co., at Leavenworth, Kan., has a contract for a highway bridge over the Arkansas River, at Arkansas City, Kansas.

The Baltimore Bridge Co. has a contract for an iron bridge over the Brazos River in Texas for the Gulf, Colorado & Santa Fe road; also for a bridge of two spans over Can non River on the River Division of the Chicago, Milwaukee & St. Paul.

The Wells & French Co., at Chicago, have just received an order for 300 box cars.

The Kansas Rolling Mills, at Rosedale, Kan., are adding machinery to manufacture fish-plates, bolts and nuts.

The Central Pacific shops at Sacramento, Cal., are to build 300 platform cars and also 12 passenger cars for the Oakland local trains.

Tramps.

The festive tramp has begun his spring journeyings, and we meet constantly with such items as the following, which is taken from the Port Jervis *Gazette* of recent date: "On the arrival of a Western freight train in this village at an early hour this morning the watchman discovered the seal of one of the cars broken, and a closer investigation revealed the fact that the car had been broken into and was occupied by tramps. Two officers were called. In the car and lying on the corn were found sixteen tramps. In attempting to arrest them four or five escaped. Those who were caught were discharged a short time afterward. Some of these men had broken into the car further west, and at every station the car stopped they would invite any of their number they saw to get in the car with them, until the sixteen had accumulated by the time the car reached Port Jervis."

The Utica *Herald* correspondent at Rome, N. Y., April 11, says: "Just after the second Atlantic express went east last night, a western bound freight train stopped at the depot, and the conductor called upon an officer to arrest some thieves whom the train hands had locked in a box car. Officers Byrnes and Guilford responded promptly. The tramps gave their names as Frank Nicholas and John Foster, and claimed Rome, Syracuse, Oneida and Schenectady alternately as their home. They had broken the seals of two or three cars and entered this one near Utica. It contained boots and shoes, eggs, etc. The train hands fastened the door of the car and kept the tramps imprisoned until they reached this station. They had armed themselves with staves, and would undoubtedly have made a stout resistance had the train hands endeavored to arrest them. As it was, they showed no fight. They were taken before Recorder Parks to-day, charged with burglary, and the conductor and brakeman of the freight train appeared against them. They were committed to jail to await the action of the grand jury. They claimed they only entered the car for the purpose of stealing a ride to Syracuse."

Queries.

What is the gauge of a one-rail railroad? This is a question now awaiting legal settlement in Pennsylvania, and, as a number of "able counsel" are engaged on both sides, its settlement promises to take both time and money.

A correspondent of the New York *World* wants to know, if two locomotives of precisely the same power and weight are tied together and headed in opposite directions under the same head of steam, how much additional force in either direction is required to move both?

A similar question was before a New York police court the other day. "Judge," said the prisoner, "if a feller's drunk, and 'er pleeceman takes hold and pulls him and ther man pulls ther pleeceman, and both on 'em's strong as the other, what's a-going to move 'em?" "Five dollars or five days," said the judge, but his answer would hardly fit the locomotive question.

Standard-Gauge Cars on Narrow-Gauge Track.

The Paw Paw (Mich.) *Free Press* states that John Ihling, of that place, has invented a new thing in railroading. It is a truck by means of which standard-gauge freight cars can be conveyed over a narrow-gauge track. The truck is built with small wheels, and a pair of them will be run into a pit under the broad-gauge car to be carried; then, both cars and trucks being drawn together, the axle of the car truck will rest upon the narrow-gauge truck, the wheels of the car just clearing the ties outside the track. In this manner a broad-gauge car can be conveniently drawn for short distances over the narrow-gauge track, and transferring will be done away with. The patterns are already made at the Detroit Car Works for an experimental set of trucks, and in a short time they will be completed and put to a practical test.

Notes.

The Central Railroad of New Jersey is noted for its "swell" brakemen. All its passenger train-men wear good clothes and put on their gloves before they handle a brake.

It may also be said that they are very polite to passengers, and take great pains in announcing the names of stations distinctly.

Consolation for some railroad men.—The times are hard—everybody says so—but at least the wages of sin have not been cut down.

The floor beams of the bridge over Ferry street, Newark, on the Newark Branch of the New Jersey Central consist of two I beams placed close together, forming a sort of long, narrow box. Eighty or more trains a day run over the bridge, but in spite of the constant noise and jar, a numerous colony of sparrows have taken possession and built their nests in the dark recesses of these floor beams.

The editor (?) of an Ohio paper recently made application to the General Passenger Agent of a railroad in that state for a pass, urging his claims thus: "I do think I hav controle of a dayley Paper that is calculated to do your R. R. moore good than eny Document in this part of. O. thare is nothing of intres passes this citey but what is notised and published dayley by me. I Clame thare is but flew Can surpass me in local itums and your agent and those intressed will tell you the same."

OLD AND NEW ROADS.

Allegan & Southeastern.—This company has filed articles of incorporation in Michigan. It is successor to the old Mansfield, Coldwater & Lake Michigan company, or at least, to the Michigan section of that road. The old company had 11¼ miles of track, from Monteith to Allegan, and a good part of the road-bed to the state line was graded.

Atchison, Topeka & Santa Fe.—As noted last week, the strike on this road came practically to an end on April 8, when all trains were moving again. The places of the strikers were filled by new men, and the company refused to take back any of those who left work. Violence was reported at Emporia, and the Governor of Kansas ordered out several companies of militia, but the reports seem to have been exaggerated, and there was no occasion to use the troops. The only serious attempt at injury to property was the firing of the Topeka shops, which the strikers disclaim. A few engines were run off at switches, to prevent the moving of freight trains, but they were not seriously damaged. The strike seems to have ended in the complete defeat of the strikers and the success of the company.

Baltimore & Ohio.—President Garrett's remarks at the directors' meeting last week are thus reported by the Baltimore *Gazette:*

"In connection with the recommendation of the finance committee to declare the dividend in stock, the President remarked that although, during the present administration, which had continued for 20 years, the dividends had been uniformly made in cash, even during the great war, at 6, 8, 9 and 10 per cent. per year; yet the form proposed by the committee was not at all novel in the history of the Baltimore & Ohio Company. At various periods prior to 1858, when the company needed money, rather than press sales of its bonds and securities, it adopted the conservative plan of using a portion of its earnings by borrowing the sum from the stockholders and issuing therefor its stock. A large amount of the cost of the road between Cumberland and the Ohio River was supplied under this system.

"In order to aid the Pittsburgh & Connellsville, the Marietta & Cincinnati, the Virginia Midland, and to construct the Chicago, the Baltimore Short Line and the Cincinnati & Baltimore roads and other enterprises associated with its interests and development, the Baltimore & Ohio Company created a floating debt, which it is the policy of the company to liquidate rapidly. The company owns large amounts of the stocks and securities of its connecting lines, some of which it will be desirable to hold for the purpose of maintaining interest and influence in regard to the policies and coöperative relations of those companies. But large amounts of the bonds of those companies now held can properly be sold when sufficiently advantageous rates can be obtained for them. The company has pursued so conservative a policy that it has heretofore paid from its net earnings, through the action of its sinking funds and by payments in cash from its net earnings, $11,651,297.67 of mortgage indebtedness, and the annual earnings upon the present investments in its sinking funds and appropriations for the payment of its mortgage indebtedness amount, at this time, to $582,000 annually. In pursuance of this conservative policy the committee has recommended that a portion of the earnings realized within the past six months, viz.: Four per cent. —being $525,768—be used for the payment of the floating debt, and that stock be issued therefor. It will be noted that this dividend will be payable in the common stock of the company. This sum is thus added to the capital, on which no interest will be paid, but only such dividends as may be declared from the net earnings, at the discretion of the directors, from time to time, on the capital stock. While the floating debt has already been materially decreased, yet this action will insure its more rapid reduction."

After the president's remarks the resolution of the committee of finance for the declaration of the dividend was unanimous y adopted.

Bradford & Foster Brook.—This road has been constructed three or four miles from Bradford, Pa., on Roy Stone's elevated one-rail plan, by a company organized under the general railroad law. Recently some of the landowners on the line applied to the Attorney General of Pennsylvania for a *quo warranto*, alleging in their application that the one-legged concern was not such a railroad as was embraced within the provisions of the act of 1868; that it had but one rail and hence no guage, and that such a concern never was intended to be embraced in the act of 1868 at the time it was passed by the Legislature. A hearing was had in Harrisburg last week, both the applicants and the company being represented by counsel; decision was reserved. Mr. Stone claims that his plan must supersede all the railroads of the present day, owing to its cheapness of construction and operation. He also claims that it can be run with great rapidity, and at the same time with entire safety. All this is denied on the other side, which holds that it is impracticable, and that its construction makes a barrier through the whole country, preventing other roads from crossing at grade or in any other way.

Central, of New Jersey.—Receiver Lathrop makes the following important announcement:

"The agreement for the adjustment of the affairs of the Central Railroad Company of New Jersey, dated 23d of February, 1878, having been signed by a majority of the stockholders, and by the others whose signatures were requisite to give effect to the said agreement, the same is declared binding.

"Stockholders who have not yet signed the agreement, can do so on or before the 25th day of April, after which date the privilege of signing will cease. Thereafter, and until the 1st day of May, such stockholders as have previously signed shall have the right to subscribe for the balance of the bonds provided for in the agreement. The 10 per cent. of the par value of the stock subscribed will be received at the places hereinafter stated on and after this date. The mortgage bonds to be given for the cash payments will bear interest from May 1, 1878, and those making payments prior to that date will be allowed interest up to that time. Payments can be made in full, or in five equal installments falling due on the 1st days of May, August and November, 1878, and February and May, 1879. Interest must be paid on all deferred payments and adjusted at the final payment. Stockholders will at the time of making payment deliver for cancellation 10 per cent. of the stock by them held. The new mortgage bonds and the income bonds not being ready for delivery, receipts will be given both for the cash payments and the shares delivered for cancellation; said receipts will be exchanged for the mortgage bonds and income bonds in sums of $100 and the multiple thereof, as soon as they are ready for delivery. The new bonds will be in denominations of $1,000, $500 and $100.

"The holders of stock and bonds of the Central Railroad Company of New Jersey and of the American Dock & Improvement Company, who have signed the agreement, are requested to present the same at the offices of the company, No. 119 Liberty street, or of Messrs. J. S. Kennedy & Co., No. 41 Cedar street, or of Messrs. Brown, Shipley & Co., London, where their subscriptions were taken, and where their bonds will be stamped, and stock and coupons received in accordance with the terms of the agreement. The holders of the Lehigh & Wilkesbarre bonds who have signed the agreement will present their bonds and surrender their coupons at the office of that company, No. 71 Broadway. The holders of the Consolidated, the Convertible, the Lehigh & Wilkesbarre, and the American Dock & Improvement Company bonds who have not signed the agreement can do so at any time prior to the 15th of May, by which date all bonds signed for must be presented as above stated, and coupons surrendered."

Cincinnati Southern.—The Ohio Legislature has passed the bill authorizing Cincinnati to borrow $2,000,000 more to complete this road to Chattanooga, provided the loan is approved by a majority of the voters at a special election. The bill forbids the use of the money for any purpose except the completion of the track to Chattanooga, except that $50,000 may be spent for terminal facilities in Cincinnati.

Columbus & Northwestern.—At a recent meeting of the board in Columbus, O., it was reported that subscriptions enough had been secured to warrant a beginning of work. It was resolved to let contracts for the 30 miles from Columbus to Mechanicsburg as soon as the final location can be completed.

Detroit & Milwaukee.—Receiver Trowbridge's report for March is as follows:

Balance, March 1	$50,963.03
Receipts on road accounts	69,160.53
Receipts from sundry sources	12,715.45
Total	$132,839.01
Disbursements	78,569.04
Balance, April 1	$54,269.97

The receipts exceeded the disbursements by $3,306.94. The amount of Receiver's notes and certificates outstanding April 1 was $344,598.70.

At a meeting of bondholders in Detroit last week it was stated that holders of all but $900,000 of the bonds have agreed to the plan of reorganization. Of those holding out, $500,000 are owned by the Merchants' Bank of Montreal, which will agree to the plan if some slight modifications are made. The committee has power to make these changes, and will probably do so, as they are not important.

Eastern Shore.—A meeting was held in Philadelphia, April 11, at which arrangements were made to foreclose the mortgages on the road and to reorganize the company on a basis which will preserve the interests of both the first and second-mortgage bondholders in the property. The road is 38 miles long, extending the Delaware Railroad from Delmar to Crisfield, Md.

Erie.—The ferry line established some time ago between the Pennsylvania Railroad terminus in Jersey City and a point in Brooklyn has been so successful that a similar one is to be established from the Erie depot to a Brooklyn landing. The boats will run to make connection with all principal trains, and a ticket office and baggage room will be established at the Brooklyn dock. The Erie already has a freight depot in Brooklyn, to which cars are carried on floats.

Evansville, Washington, Brazil & Chicago.—This company has been organized to build a railroad from Evansville, Ind., northward by way of Washington to Brazil, about 130 miles.

Fitchburg.—This company gives notice of an increase of its capital stock from $4,000,000 to $4,500,000. Until June 1 each present stockholder will be entitled to subscribe for the new stock at par, in the proportion of one share of new stock to each eight shares now held. Payment for the new stock must be made by June 20. The stockholders will doubtless avail themselves largely of the privilege of taking the new stock at par, as the stock now sells at from 115 to 117 in the Boston Stock Exchange.

Gilbert Elevated.—The New England Iron Company has begun suit to recover $4,500,000 damages for alleged breach of a contract made in 1873 for the construction of this road. The contract was to build it for $735,000 per mile, with $23,000 additional for each curve, and was conditional upon the subscription of a certain amount to the stock. Subsequently, the company was reorganized and a contract let to the New York Loan & Improvement Company, which is now building the road and has nearly completed it.

In answer, it is claimed, that the contract was not finally closed; that, if it had been, it was conditional and the conditions were never fulfilled; that the New England Iron Company was insolvent in 1873, and that it now exists only for purposes of liquidation.

Gulf, Colorado & Santa Fe.—The officers of this road are holding meetings along the line of the proposed extension of the road to Belton in Bell County, Tex., which is 175 miles beyond the present terminus and 220 miles from Galveston. The people on the line are generally anxious to secure the road and have already subscribed a considerable amount.

Hannibal & St. Joseph.—A circular or preliminary report issued by this company says: "The accompanying statement of the business of the company, for the fiscal year ending Dec. 31 last, has been prepared with care, in order to afford the board of directors, and through them the stockholders, some reliable means of judging of the earning capacity of the property when it shall have been freed from the burden of the extraordinary expenditures rendered necessary by the depreciated condition of the road and its equipment. You are aware that in July last the company was placed in possession of its land grant assets, theretofore held by Trustees as security for the company's land grant bonds, the last of which were paid prior to that date. Those assets consisted partly of cash, but mainly of contracts for land sold. The possession of these assets has enabled the company to provide the means for the payment of indebtedness incurred for the improvements made upon the property and for the further sums still required for the same purpose. Considerable expenditures have been made in relaying the road with steel rails, 74⅛ miles of which were in the track at the close of the year, of which 3,034 tons were purchased and laid during the fiscal year; the rolling stock has been put in first-class order, numerous bridges rebuilt, and many other important improvements made. The floating debt of the company has been largely reduced, many litigated cases, including arrears of taxes to the amount of over $100,000, have been compromised and paid, and every effort has been made to put the affairs of the company on a sound basis.

"A thorough revision and reorganization of the system of accounting is in progress, the results of which begin to be apparent in the more thorough knowledge of current transactions, though not yet sufficiently progressed to enable the board of directors to present a full report of the condition of the company, as it is their intention to do at the earliest possible moment."

The earnings for 1877 were as follows:

Freight	$1,210,648.05
Passengers	524,400.79
Express and mail	85,028.57
Bridge tolls and miscellaneous	111,287.91
Total ($6,525 per mile)	$1,931,365.32
Expenses (58.81 per cent.)	1,135 886.46
Net earnings ($2,687 per mile)	$795,478.86
Interest on funded debt	660,000.00
Balance	$135,478.86

"This balance, together with the receipts from the company's lands, has been applied to the extraordinary expenditures for the improvement of road-bed and track, the payment of the arrears of taxes, and other expenses arising out of transactions of former years, referred to above, and amounting during the year to $341,798.86. Since the assets of the Land Department reverted to the company, to the close of the year, the net receipts, including the cash turned over by the Trustees, have been $241,877.10. On Jan. 1 contracts for the sale of lands, upon which there remained due upward of $2,500,000, were placed in the hands of the Farmers' Loan & Trust Company, to secure an issue of bonds to the amount of $1,000,000, of which there have been sold to this date $335,000, at 95 and accrued interest, and the proceeds devoted to the further improvement of the property."

Indianapolis, Decatur & Springfield.—This company has contracted for 1,500 tons of rails to be delivered this month, and intends at once to lay the track on the road-bed now graded from the present terminus at Montezuma, Ind., east 19 miles to Bruin's, the crossing of the Logansport, Crawfordsville & Southwestern road.

Intercolonial.—The Candian Government has introduced in Parliament a resolution authorizing the purchase of the Rivière du Loup Division of the Grand Trunk. The object of the purchase is to give the Government control of the entire line used by the Intercolonial to Quebec, and to make some improvements, which the Grand Trunk is not willing to do. That company is willing to part with the line, for it has never been profitable, indeed has hardly ever earned its running expenses.

Kalamazoo, Lowell & Northern Michigan.—This project has lately been revived, and a contract has been let to Mr. French, of Montpelier, Vt., who agrees to have it in operation from Kalamazoo, Mich., north by west to Hastings, about 30 miles, by September next, provided $75,000 can be raised along the line.

Longview & Sabine Valley.—Track is now being laid on this road from Longview, Tex., southward, and a section of 10 miles was last week ready for inspection by the State Engineer. Work on the road is to be pushed forward.

Memphis, Kansas & Colorado.—The first rail on this road was laid with much ceremony on April 10, at the crossing of the Missouri River, Fort Scott & Gulf road near Cherokee, Kan.

Michigan Central.—The Detroit *Tribune* says: "The Michigan Central Railway has bought 4,000 tons of steel rails, and will relay the Grand River Valley Division and five miles of the Air Line, making the latter all steel; also, a new track from Three Oaks to Galien, completing a double track from Niles to Chicago—and, indeed, from Jackson to Chicago, if the Air Line is taken into consideration."

Minneapolis & St. Louis.—It is proposed to extend the leased Minneapolis & Duluth road from White Bear, Minn., northwest to the St. Croix River and then northward up that stream to Taylor's Falls, a distance of about 25 miles.

Minnesota Midland.—The new parties who now control this road are actively at work on its extension to Zumbrota, Minn., 39 miles westward from the present terminus. About 100 men are at work.

Minnesota Valley.—Grading is reported in progress on this road, which will be a branch of the Winona & St. Peter, extending from Sleepy Eye, Minn., northward to the Minnesota River, near Redwood Falls, about 25 miles.

Missouri Pacific.—Peter Marie and others, holders of 36,000 shares of stock in the old Pacific Railroad Company of Missouri, have brought suit to recover the value of the same from C. K. Garrison and others. They claim that there was an agreement or understanding that they should not lose their stock, and in consequence they withdrew their opposition to the foreclosure of the third mortgage. The road was bought by the bondholders, however, and the stock was not made good, and they now seek to get back its value.

Mobile & Ohio.—A new arrangement of the operating divisions has been made, and the dividing point will be Tupelo, Miss., instead of Macon as heretofore. The Southern Division now extends from Mobile to Tupelo, 279 miles, including also the Aberdeen, Columbus, Starksville and Gainesville branches; the Northern Division extends from Tupelo to Columbus, Ky., 193 miles.

Nashville, Chattanooga & St. Louis.—An extension of the Jasper Branch is to be built from a point near Victoria, Tenn., to the ore-beds on Waldron's Ridge. The distance is about five miles, and the road will be used chiefly to carry iron ore to the new furnaces at South Pittsburgh.

New England Car Clearing House.—At a meeting of Superintendents of New England railroads in Boston, April 12, to consider the subject of car mileage, it was resolved that a clearing-house association for the New England States should be organized, to date from May 1, or as soon thereafter as possible. The central office is to be in Boston.

New Orleans, Mobile & Texas.—The United States Circuit Court in New Orleans has ordered the re-sale of this road by the trustee in possession, who is to give 30 days' public notice, and also to send notice by mail to all the bondholders, as far as possible. All costs, expenses and prior liens must be paid by the purchaser in cash; the balance may

be paid in bonds or coupons at their *pro-rata* value. In entering this order, the Court says that the long period which has elapsed from the date of the sale heretofore made under the order of Court; the abortive efforts that have been made to sell the property or to organize the beneficiaries of the trust in any measure for the common benefit; the deterioration of the property for the want of repairs and improvements; the danger of the loss of franchises and privileges granted to the company for non-fulfillment of the conditions in the charter or for a non-use would seem to render a re-sale proper, that the property might go into hands competent and willing to make it useful.

New London Northern.—A fire started in the car house of this road in New London, Conn., April 11, which destroyed property valued at $35,000, including the brick building, 225 by 60 feet, ten passenger cars, two baggage cars and a freight car. There was an insurance of $18,300 on the property.

Northern Pacific.—A dispatch from Washington, April 15, says: "The representatives of the two rival Northern Pacific Railroad bills agreed upon a compromise to-day, to which the officers of the Northern Pacific Company also acceeded. In substance, the agreement is that if the Senate Committee on Public Lands will surrender the Windom bill which is referred to it, Senator Mitchell will agree to move to recommit his own bill and to amend it by striking out that portion relating to the Portland & Salt Lake Railroad. The Northern Pacific people on their part will agree to build a road along the Columbia River within three years. The secret of the opposition of the Northern Pacific managers to any provision requiring a road to be built along the river is that some of the stockholders are interested in the portages of the river, and do not desire the railroad to come into competition with the Oregon Steam Navigation Company, which now has a monopoly of the business.

Southeastern, of Canada.—At a meeting of the managers of this company and the Connecticut & Passumpsic Rivers Company in Montreal last week a compromise was arranged. The Southeastern is to be allowed to operate the Missisquoi & Clyde Rivers road, and the operation of the through line between Boston and Montreal is to be resumed. The Southeastern debt to the Passumpsic Company is to be reduced about one-half, and interest on the balance paid punctually.

Ohio & Mississippi.—The Committee of Reorganization has submitted a report containing a plan for the reorganization of the company without foreclosure. The report states that the floating debt at the time of the Receiver's appointment was $1,401,736, and it has now been reduced to $659,409. The debt, outside of the bonded debt, on April 1, was as follows:

Overdue January coupons, first mortgage		$237,020
Three overdue coupons, second mortgage		402,780
Interest on debenture bonds		9,800
November coupon, Springfield Division bonds		70,000
Total interest		$719,600
Floating debt ordered paid by Court	$112,159	
Floating debt under consideration	547,250	
		659,409
Total		$1,379,009

The Receiver reports the net surplus for the entire line under his administration:

Nov. 17, 1876, to July 31, 1877, eight months, 13 days	$312,049
Aug. 1, 1877, to March 31, 1878, eight months	680,598
Total	$992,647

The committee believe it best to continue the receivership for the present, but think that it may be terminated by the close of the present year, if all parties in interest unite. The plan proposed is substantially as follows:

1. On the first-mortgage bonds coupons to be paid regularly hereafter, the coupon now overdue to remain until the floating debt is arranged.

2. On the second-mortgage bonds the three coupons now overdue and one in addition, making four in all, to be funded in 10-year, 7 per cent. bonds, to be secured by deposit of the coupons funded with the Union Trust Company.

3. On the debenture bonds, only $140,000 of which are outstanding, interest to be paid regularly, but payment of the sinking fund of $20,000 per year to be suspended.

4. On the Springfield Division bonds coupons to be funded up to and including that of Nov. 1, 1878, and the amount of the authorized issue ($3,000,000) to be reduced.

If these arrangements are carried out the amount to be provided for this year will be $669,210, besides the coupons on the first-mortgage and debenture bonds. It is estimated that the earnings of the road will furnish about $330,000 of this amount, besides the coupons, leaving $339,210 to be met. As to this amount it is proposed to make arrangements with three principal creditors representing $350,000 of the debt to accept payment in four quarterly installments of $25,000 beginning Aug. 1, 1878, and two annual installments of $125,000 payable May 1, 1879, and May 1, 1880, the amount to be secured by pledge of Springfield Division bonds. Under the proposed arrangement the fixed interest charges on the property after 1879 will not exceed $960,000 per year. The net earnings for four years have been as follows: 1872–73, $1,141,109; 1873–74, $931,193; 1874–75, $863,510; 1875–76, $757,137.

Receiver King's report to the Court for March is as follows:

Balance, March 1		$20,658
Receipts		292,242
Total		$312,900
Vouchers and arrears prior to Nov. 18, 1876	$33,621	
Vouchers and pay-rolls subsequent to Nov. 18, 1876	257,269	
		290,890
Balance, April 1		$22,010

The receipts exceeded the disbursements by $1,352 for the month.

Olean, Bradford & Warren.—The branch line proposed to reach some new oil territory will leave the main line at Tarport, Pa., and run through the valleys of Kendall, Boyd and Knapp's creeks to Eldred, N. Y., about 16 miles. It will be built by a separate company, but will be owned and controlled by the same parties as the main line.

Oregon Steam Navigation Company.—Oregon letters say that this company has decided to build a railroad between the Upper and Lower Cascades of the Columbia River on the Oregon or south side of the river. Work has already been begun on the grading.

Pennsylvania.—The trial of a suit against this company to recover damages for goods lost in the Pittsburgh riots last July was begun in the United States Circuit Court in Philadelphia this week. The suit is that of Sherman, Hall & Co., of Chicago, one of a great number pending, and is taken as a test case. At the opening of the case both parties agreed to accept as facts the shipment of the goods and their destruction at Pittsburgh by fire. The first question in the case arose as to the party upon whom the burden of proof as to negligence should rest, and this the Court decided for the company, holding that the plaintiffs must submit evidence to show that the loss was a result of the negligence of the company.

Philadelphia & Reading.—This company's statement for February and for the three months of its fiscal year ending Feb. 28, is as follows:

	February		Three months	
Gross Receipts:	1878.	1877.	1878.	1877.
Railroad traffic	$482,238	$673,036	$2,999,442	$2,177,872
Canal traffic	571	372	17,707	8,627
Steam colliers	42,601	66,565	168,367	175,293
Richmond coal barges	.. ....	70	17,878	5,371
Total Railroad Co.	$525,410	$740,043	$2,503,394	$2,367,163
Coal & Iron Co.	319,060	475,957	1,479,063	1,380,646
Total	$844,470	$1,216,000	$3,982,457	$3,747,809
Traffic:				
Tons coal	173,462	321,656	1,052,513	1,083,436
Tons merchandise	237,283	229,657	714,784	736,468
Passengers	399,057	430,853	1,462,683	1,056,976
Tons coal carried by steam colliers	44,114	52,693	141,618	111,247
Tons Coal Mined:				
By Coal & Iron Co.	65,681	133,114	524,445	477,608
By tenants	28,047	54,006	173,134	212,871
Total	93,728	$187,120	$697,579	$690,479

The great reduction in the February returns is due to the voluntary suspension of coal production under the agreement with the other coal companies, affecting the entire traffic of the road for the month.

Pittsburgh Southern.—This company has already arranged for its line to Washington, Pa., and the people along the line are now offering subscriptions for an extension from Washington to West Middletown, five miles, with expectation of carrying the line through hereafter by way of Bethany to the Ohio River at Wellsburg, W. Va.

Quebec, Montreal, Ottawa & Occidental.—A Montreal dispatch says: "The Provincial Railway Commissioners have arrived here and demanded possession of the Montreal, Ottawa & Occidental Railway, from Duncan McDonald, contractor of the western section and latterly lessee of the road. The latter refuses to hand over the road as the lease has not expired. McDonald was to have the section completed and fully equipped in October last for $3,600,000. The Government have advanced him over $200,000 in excess of the contract price, and it will take $600,000 more to complete the work specified in the contract. The Government will probably take forcible possession without delay."

Rochester & Northern Minnesota.—Contracts are reported let for the construction of this road, from Rochester, Minn., on the Winona & St. Peter road, north by west to Pine Island, in Goodhue County, about 35 miles.

Sheboygan & Fond du Lac.—It is reported that this road is to be extended from Princeton, Wis., westward about 70 miles to Elroy, the junction of the West Wisconsin road and the Madison Division of the Chicago & Northwestern.

South Carolina.—At the annual meeting in Charleston, April 9, the plan for funding the second and non-mortgage bonds in new consolidated bonds and for reducing the debt was discussed and finally referred to a meeting of bondholders to be called by the President. The plan was approved so far as the stockholders were able to act upon it.

Spencer Branch.—The town of Spencer, Mass., has voted to subscribe $25,000 to the stock of a road from Spencer Centre to Spencer Station on the Boston & Albany, about three miles. This secures the building of the road.

Springfield, Jackson & Pomeroy.—The track on this road is now laid to Greenfield, O., nine miles beyond the last point noted and 50 miles southwest of Springfield. Regular trains will run to Greenfield this week.

St. Andrews & St. Croix.—This road, for which a charter has been asked, is to run from St. Andrews, N. B., northwest along the shore of the St. Croix River to St. Stephen, about 20 miles. For half the distance the line is near that of the St. Andrews Branch of the New Brunswick & Canada, and on the other side it has an excellent water route by the river.

Umatilla & Blue Mountain.—This company was organized last year to build a narrow-gauge railroad from Umatilla, Oregon, on the Columbia River, east by south to La Grande in the Grande Ronde Valley, a distance of 80 miles. It is now said that the Oregon Steam Navigation Company has promised aid, and the road will be built at once.

Utah Southern.—Preliminary surveys are to be made for an extension of this road southward from the present end of the road at Terminus, 75 miles south of Salt Lake, Utah. How far the line will be run is not decided, but the intention is to carry the road down into Arizona at some future time.

Victoria Railway.—A correspondent says: "This line has been projected to extend from Lindsay, Ont., north to the Ottawa River at its junction with the Mattawan. The first 33 miles north from Lindsay were completed in the winter of 1876 and put into operation in April, 1877. In August, 1877, construction was resumed northward, and it is expected that 22 miles additional will be completed by October next. The gauge is 4 ft. 8½ in. There are several fine bridges and a number of heavy rock cuttings. The work from the start of the first survey has been under the management and direction of the Chief Engineer and General Manager, Mr. James Ross, formerly of the Ulster & Delaware and Wisconsin Central. Mr. Geo. Laidlaw of Toronto is President, C. J. Campbell, Vice-President, H. E. Suckling, Secretary and E. H. Brennan, formerly of the Prince Edward Island Road, Assistant Manager and Auditor. A branch is now being constructed a distance of six miles into the Snowdon iron mines, and large quantities of iron ore of a very rich quality, destined for the American side, will begin moving about July next. The traffic on the Victoria exceeds the most sanguine expectations of its promoters both in passengers and freight."

Warm, Hot, Healing Springs & Covington.—Un- this name a charter has been granted for a narrow-gauge railroad from the Chesapeake & Ohio at Covington, Va., north by west through Healing Springs and Hot Springs to Monterey in Highland County, a distance of nearly 50 miles.

Wilmington, Columbia & Augusta.—As a result of the meeting of bondholders in Baltimore last week, application was made to Judge Bond of the United States Circuit Court for the appointment of a receiver, holders of $3,900,000 of the bonds joining in the petition. An order for a receiver was granted, and Mr. R. R. Bridgers, President of the Company, appointed. This result was not unexpected, as the earnings of the road have been entirely insufficient to meet the charges upon it for some time. Default was made in January last in the rental dividend due the Wilmington & Weldon Company, which had previously been regularly paid. The road extends from Wilmington, N. C., to Columbia, S. C., 189 miles. It was originally the Wilmington & Manchester, but was reorganized under the present name soon after the war, and then extended to Columbia. The funded debt consists of $3,200,000 first mortgage bonds, $600,000 income bonds, $336,000 funded coupon certificates and $224,000 unpaid coupons, there being now five coupons unpaid, three of which were funded.

By the terms of the Wilmington & Weldon lease, that company can demand possession of its road at any time after April 15, the rental being still unpaid, and it is said that the lease will be given up and the road returned to its owners.

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Galveston, Harrisburg & San Antonio.

This company owns a line from Harrisburg, Texas, westward to San Antonio, 215 miles. The road was completed to San Antonio March 1, 1877, making the average mileage for the year 1877, covered by the reports, 209 miles. A branch to New Braunfels, 10 miles long, is to be built.

The equipment consists of 21 engines; 17 passenger and 5 baggage, mail and express cars; 141 box, 131 stock, 161 flat and 6 caboose cars; 1 derrick and 78 other service cars.

The general account at the close of the year was as follows:

Stock paid in		$4,638,794.40
Represented by lands and city bonds		1,811,205.60
Total stock ($30,000 per mile)		$6,450,000.00
Bonds ($19,535 per mile)		4,200,000.00
Floating debt ($9,550 per mile)		2,053,281.73
Due school fund, State of Texas		407,066.82
Total ($60,978 per mile)		$13,110,348.55
Road, equipment and real estate ($51,680 per mile)	$11,111,289.34	
Company's bonds unissued	1,399,000.00	
Bexar County bonds	200,000.00	
Cash and materials	62,244.09	
Bills, accounts, etc., receivable	337,815.12	
		13,110,348.55

The funded debt consists of 6 per cent. first-mortgage railroad and land bonds. The $1,399,000 unissued and the $200,000 Bexar County bonds are held as offsets to the floating debt. The road has a land grant of 16 sections to the mile, the proceeds of which are to be used in paying off the bonded debt. The debt due the State School fund bears 6 per cent. interest and an annual sinking fund of 2 per cent. The floating debt consists of $1,248,635.56 bills payable, $770,038.90 other liabilities, $840 coupons unclaimed and $33,767.27 current balances.

The earnings for the year were as follows:

Passengers		$176,460.38
Freight		820,109.84
Mail and express		30,633.78
Other sources		25,364.23
Total ($5,036.21 per mile)		$1,052,568.23
Expenses (34.22 per cent)		360,204.72
Net earnings, ($3,312.74 per mile)		$692,363.51
Interest on funded debt	$136,055.19	
Premium, interest on floating debt, State loan, etc	233,161.86	
Other payments	17,585.02	
		386,802.07
Surplus		$305,561.44

This surplus was used for construction. The proportion of expenses appears very small, but for a large part of the business of the road there is no competition, and much of it will bear pretty high rates. The traffic was as follows:

Train mileage, passenger	144,848
" " freight	219,050
" " service	129,772
Total	493,620
Passengers carried	42,194
Passenger mileage	3,709,517
Tons freight carried	85,934
Tonnage mileage	15,558,940

The passenger and freight movement given is for 10 months only, the records for August and September having been destroyed by fire.

Columbus & Hocking Valley.

This company owns a main line from Columbus, O., southeast to Athens, 76 miles; the Straitsville Branch, from Logan to New Straitsville, 13 miles; the Monday Creek Branch, from Nelsonville to Grafton, 7 miles, and the Snow Fork Branch, from Bessemer to Orbiston, 4 miles, making 100 miles in all. The two last-named branches were not completed until just at the close of the year; both are to be extended further during the current year to serve blast furnaces now being built. The report covers the year 1877.

The equipment consists of 31 engines; 8 passenger, 1 combination and 3 baggage cars; 100 box, 1,002 eight-wheel coal and 14 caboose cars. There are also 786 eight-wheel and 100 four-wheel coal cars on the road owned by coal operators.

The general account is as follows:

Stock ($20,116 per mile)		$2,011,600.00
Bonds ($25,000 per mile)		2,500,000.00
Bills and accounts payable		71,349.24
Renewal account		42,000.00
Contingent account		407,329.25
Total ($50,323 per mile)		$5,032,278.49
Construction accounts ($48,366 per mile)	$4,836,565.60	
Cash	33,693.00	
Bills and accounts receivable	31,119.89	
Sinking funds	130,900.00	
		$5,032,278.49

Stock was increased by $90,600. The cost of the Monday Creek and Snow Fork branches to the close of the year was $164,293.68. The earnings for the year were as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Passengers	$90,262.82	$89,867.01	I. $395.81	0.5
Freight	720,932.85	733,364.44	D. 12,431.59	1.6
Express, mail, etc.	17,704.13	17,907.62	D. 203.49	1.1
Total	$828,899.80	$841,139.07	D. $12,239.27	1.5
Expenses	471,143.87	454,304.83	I. 16,839.04	3.7
Net earnings	$357,755.93	$386,834.24	D. $29,078.31	7.5
Gross earn. per mile	9,313.48	9,451.00	D. 137.52	1.5
Net " "	4,019.73	4,346.45	D. 326.72	7.5
Per cent. of expenses	56.84	54.01	I. 2.83	5.6

The decrease in earnings was caused by the lower rates received on the freight business of the road, the bulk of traffic having increased. The contingent or income account was as follows:

Net balance from 1876, after paying February dividend		$303,808.15
Net earnings for 1877		357,755.93
Total		$661,654.08
Cash dividend Aug. 10	$8,368.00	
Stock dividend Aug. 10	68,550.00	
Interest on funded debt	177,327.50	
Interest on floating debt	81.33	
		254,324.83
Balance Dec. 31, 1877		$407,329.25
Dividend, Feb. 10, 1878, from earnings of 1877		80,464.00
Net balance to 1878		$326,865.25

The August dividend was fully earned, but the board believed it better to pay in stock and use the money for the building of the new branches than to offer the new stock for sale for the same purpose.

The traffic for the year was as follows:

Mileage of:	1877.	1876.	Inc. or Dec.	P.c.
Locomotives	682,514	674,652	I. 7,862	1.2
Passenger train cars.	319,363	314,940	I. 4,423	1.4
Freight cars	8,535,690	8,384,261	I. 151,429	1.8
Passengers carried	139,445	129,767	I. 9,678	7.5
Passenger mileage	3,228,815	3,151,140	I. 77,675	2.5
Tons freight carried.	899,407	842,824	I. 56,583	6.7
Tonnage mileage	55,860,504	47,572,017	I. 8,288,487	17.4
Rate per mile:				
Per passenger	2.80 cts.	2.85 cts.	D. 0.05 ct.	1.8
Per ton of freight	1.29 "	1.54 "	D. 0.25 "	16.2

The coal tonnage was: 1877, 800,795; 1876, 782,316; 1875, 753,016. Coal was 89.5 per cent. of the total tonnage last year.

There were laid 2,000 tons of steel rails on the main line and Straitsville Branch, completing steel track from Columbus to Straitsville. Much of the iron replaced was used on the new branches.

Pennsylvania & New York.

This road forms an extension of the Lehigh Valley from Wilkesbarre, Pa., northwest to the Erie at Waverly, N. Y., 105 miles. It is substantially owned by the Lehigh Valley Company. It was built on the line of the old Pennsylvania & New York Canal, which is now abandoned except a short section in Wilkesbarre. The report, which covers the year ending Nov. 30, 1877, gives the following statement of track owned:

	Miles.
Main Line, Wilkesbarre to State Line	104.30
Second track	33.96
Sidings and second track used as sidings	46.36
Waverly & State Line R. R. and sidings	3.71
Other sidings on Main Line	2.20
Geneva, Ithaca & Sayre connection	2.94
Southern Central connection	4.08
Barclay R. R. connection	2.71
Pleasant Valley Branch	5.82
Plainsville Branch	0.90
Mill Creek Branch	2.61
Mineral Spring Branch	1.06
Total track	210.65

There was an increase during the year of 8.42 miles of second track and sidings.

The equipment consists of 50 locomotives; 245 box, 95 stock, 200 gondola, 57 platform, 100 eight-wheel coal, 800 four-wheel coal, and 32 caboose cars; 3 derrick and 31 gravel cars. It was increased during the year by 14 box and 98 eight-wheel coal cars. Passenger equipment is furnished by the Lehigh Valley.

The earnings and expenses for the year were as follows:

Transportation of:	Earnings.	Expenses.	Net earn.	P. c. of Exps.
Coal	$935,959.85	$509,317.83	$426,642.02	54.41
Freight	422,044.58	269,936.19	152,108.39	63.67
Passe'r, express and mail	158,118.59	118,267.66	39,850.93	74.85
Canal earnings	378.65	1,848.32	*1,469.67	487.68
Miscellaneous	45,883.60	.....	45,883.60	.....
Totals	$1,562,385.27	$899,370.00	$663,015.27	57.56
Totals, 1876	1,678,338.74	1,070,229.66	608,109.08	63.77
Inc. or Dec.	D.$115,953.47	D.$170,859.66	I.$54,906,19	D.6.21
Per cent	6.91	15,96	9.03	9.74

*Loss.

The report of the President, Mr. Robert H. Sayre, says: "There has been paid during the year $210,000 for interest on bonds, leaving $453,015.27, applicable to taxes, dividends, interest, etc. The result will enable us to declare a dividend of $350,000, being 10 per cent. on the preferred stock outstanding in 1875.

"The protracted strike of the miners in Wyoming Region, from which our tonnage is derived principally, involved irregularity in our business, and prevented so great a reduction in the operating expenses as would otherwise have resulted. The lower rates obtained for transportation of coal, and the great falling off in travel, reduced the income from both those sources, in the aggregate $173,906.92." The receipts from miscellaneous freight traffic show an increase of $34,714.80. * *

"The tonnage of the Buffalo Creek Railroad has been larger than that of any previous year, and its receipts have, for the first time in its history, been sufficient to meet the operating expenses, taxes and interest on the floating debt, yielding no return, however, as yet, upon the original investment. The tonnage over it during the past year was coal 242,983 tons, miscellaneous 130,530 tons, resulting in a gross revenue of $41,249.99. * *

"The building of shops at Sayre for repairs of our locomotives and cars has become a necessity, and it is proposed to commence their erection in the ensuing spring. Plans are being prepared for buildings of sufficient capacity for all our future wants, but only such portions will now be built as our present necessities demand."

The traffic of the year was as follows:

	1877.	1876.	Inc. or Dec.	P.c.
Passengers carried	170,853	333,785	D. 162,932	48.8
Passenger mileage	7,581,092	19,310,879	D. 11,729,787	60.7
Tons freight carried	451,729	358,632	I. 93,097	26.0
Tonnage mileage	38,710,072	29,419,044	I. 9,291,028	31.6
Coal tonnage:				
Anthracite	911,755	804,345	I. 107,410	13.4
Bituminous	340,501	361,608	D. 21,107	5.8
Total	1,252,256	1,165,953	I. 86,303	7.4
Coal tonnage mileage:				
Anthracite	81,685,080	69,283,037	I. 12,402,043	17.9
Bituminous	7,890,448	7,945,194	D. 54,746	0.7
Total	89,575,528	77,228,231	I. 12,347,297	16.0
Average rates per mile:				
Per passenger	2.08 cts.	1.65 cts.	I. 0.43 cts.	26.1
Per ton of freight	1.09 "	1.32 "	D. 0 23 "	17.4
Per ton of coal	0.83 "	1.13 "	D. 0.30 "	26.5

The passenger business of 1876 was so exceptional that a comparison with it is hardly fair. Compared with 1875 there was a decrease of 15.38 per cent. in passengers carried, and an increase of 29.84 per cent in passenger mileage. The local travel has decreased from various causes, and through travel has gained largely.

Coal tonnage northward shows an increase, entirely in deliveries to the Erie, the business having improved decidedly since the third rail was laid on that road to Buffalo. The total amount of coal delivered to Erie Railway, in narrow-guage cars, for transportation via third rail to points west of Elmira, during the year, was 234,796 tons. Of this amount the road hauled with its own trains, between Waverly and Buffalo, 186,345 tons in regular coal cars, mostly for reshipment by lake from Buffalo. The remaining 48,451 tons, loaded in return box cars, and chiefly consigned by all rail routes to points west of Buffalo, was hauled in Erie Railway trains from Waverly. The western freight and line cars, received with grain and other freight, have been loaded back with coal. The amount loaded in cars returnable via Erie Railway, as stated above, was 48,451 tons; in cars returnable via Geneva, Ithaca & Sayre, 4,751 tons; and via Southern Central, 3,782 tons, making a total of 56,984 tons in line cars.

As stated above, 8.42 miles of new second rack and sidings were built during the year; 7,327 steel rails and 1,808 iron rails were used in renewals. Five spans of double and five of single track iron bridges were built to replace wooden structures. A new office building at Sayre was completed and an engine house built at Buffalo for engines running over the Erie.

LOCOMOTIVE RETURNS, DECEMBER, 1877.

Master Mechanics of all American railroads are invited to send us their monthly returns for this table.

Name of Road.	Number of miles operated	Number of Locomotives in service	Mileage. Total	Mileage. Average per Engine.	No. Miles run to Ton of Coal	No. Miles run to Cord of Wood	No. Miles run to Pint of Oil	Average No. of freight cars hauled	Average cost per freight car per mile, cents	Cost per Mile in Cents for Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	Average Cost of Coal per ton	Average Cost of Wood per cord
																$	$
Allegheny Val., River Div.*	139	43	88,544	2,059	39.50	.....	22.21	18.90	0.972	5.09	3.10	0.54	.....	6.39	15.12	.....	.....
" " Low Gr'de Div.*	110	20	38,211	1,911	27.44	.....	18.62	18.60	1.229	7.20	4.39	0.69	.....	6.63	18.91	.....	.....
Atlantic & Great Western, 1st & 2d Divs	228	83	190,697	2,298	40.66	.....	16.43	.....	.....	4.74	5.04	0.55	0.85	6.27	17.45	1.94	2.79
3d & 4th Divs	197	48	134,139	2,795	31.69	.....	21.14	.....	.....	5.73	5.98	0.45	0.67	5.91	18.74	1.68	2.79
Mahoning Div	88	54	89,934	1,665	45.17	.....	23.18	.....	.....	4.29	4.63	0.40	0.64	5.92	15.88	1.97	2.79
Atlantic & Gulf	343	22	59,370	2,827	.....	46.98	11.36	.....	.....	6.90	4.12	0.43	.....	7.49	19.04	.....	1.90
Cairo & Vincennes	157	11	39,681	3,607	38.00	.....	12.90	.....	.....	3.44	4.31	0.40	.....	5.38	13.53	1.59	.....
California Pacific	152	13	32,962	2,536	38.65	.....	18.90	.....	.....	2.28	15.93	0.59	0.44	7.25	26.49	6.00	5.75
Cen. Pac., Western Div.†	201	53	132,715	2,504	37.06	.....	16.61	.....	.....	4.85	16.63	0.67	0.72	7.95	30.81	6.00	5.75
" " Visalia Div.†	157	10	22,685	2,269	55.19	.....	20.24	.....	.....	4.65	11.17	0.50	0.70	7.08	24.10	6.00	5.75
" " Tulare Div.†	171	10	23,433	2,343	42.57	.....	13.05	.....	.....	6.21	14.45	0.77	0.26	6.75	28.44	6.00	6.00
" " Los Angeles, San Diego, Yuma & Wilmington Divs.†	408	20	51,667	2,583	61.30	.....	18.00	.....	.....	2.77	10.17	0.67	0.02	8.36	21.99	6.00	5.75
" " Sacramento Div.†	120	35	75,611	2,160	.....	27.60	16.10	.....	.....	9.74	20.84	0.73	0.43	9.55	41.25	.....	5.75
" " Oregon Div.†	152	6	17,908	2,985	.....	39.19	19.19	.....	.....	13.78	14.68	0.53	0.27	8.20	37.46	.....	5.75
" " Truckee Div.†	205	29	68,812	2,373	33.54	27.42	16.47	.....	.....	3.38	19.40	0.61	0.62	8.43	32.44	6.00	5.75
" " Humboldt Div.†	201	22	54,793	2,481	41.23	.....	22.17	.....	.....	5.02	14.91	0.48	0.42	7.59	28.42	6.00	5.75
" " Salt Lake Div.†	219	27	76,728	2,842	27.61	.....	14.99	.....	.....	3.81	22.06	0.71	0.46	7.21	34.25	6.00	5.75
Cleve., Col., Cin. & Ind., Columbus Div	138	58	163,489	2,820	40.88	44.83	29.92	.....	.....	2.88	4.69	0.52	0.70	5.80	14.59	1.75	3.50
Indianapolis Div	203	63	197,473	3,134	38.13	44.69	22.66	.....	.....	4.23	5.25	0.60	1.21	5.73	17.02	1.75	3.50
Cincinnati Div	130	33	86,625	2,625	38.55	.....	18.63	.....	.....	4.81	4.88	0.61	0.91	5.87	17.08	1.75	3.50
Cleveland & Mahoning Valley	41	6	15,436	2,573	43.97	.....	25.38	.....	.....	2.71	4.48	0.26	1.11	6.16	14.72	1.84	2.74
Cleveland & Pittsburgh*	199	75	156,064	2,081	45.54	.....	19.92	15.40	0.898	3.42	2.94	0.50	2.17	6.46	15.49	1.17	3.36
Del., Lackawanna & Western, Bloomsburg Div.‡	80	24	54,470	2,270	.....	.....	38.36	.....	.....	3.21	.....	0.58	.....	4.92	8.71	.....	.....
Erie & Pittsburgh*	98	27	46,460	1,721	42.04	.....	15.36	16.60	0.870	3.13	3.67	0.68	2.28	6.70	16.46	1.52	1.52
Ill. Cen., Chicago Div.§	253	63	147,029	2,334	36.57	.....	14.47	17.74	.....	4.42	5.57	0.32	.....	5.98	16.29	1.90	4.50
" " South Div.§	231	31	78,486	2,532	37.87	.....	14.73	15.77	.....	5.94	5.32	0.32	.....	5.86	17.44	1.90	4.50
" " North Div.§	225	41	78,779	1,921	35.40	.....	14.04	12.53	.....	6.14	5.70	0.33	.....	5.96	18.13	1.90	4.50
" " Springfield Div.§	111	10	28,938	2,894	43.65	.....	13.25	10.79	.....	4.08	4.61	0.39	.....	5.19	14.28	1.90	4.50
" " Iowa Div.§	401	45	98,432	2,187	31.50	.....	15.63	11.42	.....	4.51	9.33	0.35	.....	6.16	20.35	2.75	4.70
Jeff'nville, Madison & Ind's*	226	40	86,789	2,170	40.66	31.32	14.05	18.37	1.020	4.28	6.36	0.48	1.98	5.90	19.00	2.50	2.20
Kansas Pacific	781	68	154,496	2,272	23.03	.....	11.87	.....	.....	5.76	14.29	0.48	.....	7.28	27.81	3.26	3.78
Kansas City, St. Jo. & Council Bluffs¶	275	31	88,806	2,865	48.30	.....	25.00	16.90	.....	3.20	6.10	0.40	.....	6.50	16.20	2.75	3.50
Lake Shore & Mich. Southern. Buffalo Div.**	.....	89	183,069	2,656	37.19	.....	.....	.....	.....	4.50	8.48	0.40	.....	5.88	19.29	3.05	5.69
Erie Div.**	.....	113	205,438	1,818	35.03	.....	.....	.....	.....	3.30	8.18	0.36	.....	5.98	17.85	2.74	5.43
Toledo Div.**	.....	85	146,581	1,724	28.31	62.76	.....	.....	.....	3.91	10.74	0.44	.....	5.84	20.86	3.12	4.08
Mich. Southern Div.**	.....	208	384,166	1,846	37.92	60.16	.....	.....	.....	4.48	9.08	0.30	.....	5.98	19.99	3.55	4.63
Little Rock & Fort Smith	168	.....	17,834	.....	.....	63.68	14.34	.....	.....	0.73	3.37	0.46	.....	5.94	10.50	.....	2.00
Louisv'e & Nash., First Div.**	332	.....	120,760	2,474	28.00	37.17	12.59	.....	.....	2.97	8.49	0.39	2.24	7.10	21.19	2.29	2.51
" " Second Div.**	200	.....	87,590	2,474	26.50	.....	11.29	.....	.....	4.97	7.98	0.46	1.95	6.05	21.41	2.07	2.79
" " Memph. Div.**	131	.....	49,135	2,474	28.50	.....	13.46	.....	.....	3.62	11.61	0.52	2.13	6.26	24.14	3.17	2.85
" " Nashville & Decatur Div.**	122	.....	44.383	2,474	32.00	.....	13.54	.....	.....	2.28	8.71	0.59	1.97	6.20	19.75	2.72	3.00
" " S. & N. Alabama R. R.**	183	.....	69,295	2,474	32.75	.....	12.21	.....	.....	4.28	7.10	0.70	1.28	6.28	19.64	2.25	2.00
Marq., Hought'n & Ontonagon	88	9	9,300	1,033	49.97	.....	22.04	17.00	.....	1.76	10.39	0.63	.....	6.37	19.15	5.00	.....
Missouri, Kansas & Texas††	786	79	226,862	2,872	33.19	.....	9.94	13.10	1.470	5.02	5.81	0.56	.....	6.44	17.83	1.95	.....
Northern Central, Elmira & Canandaigua Divs	147	43	82,799	1,926	26.77	.....	15.63	.....	.....	5.82	5.88	0.75	.....	5.69	18.14	1.50	2.40
Penn., New York Div.‡‡	120	112	280,184	2,502	31.03	.....	10.22	.....	.....	4.40	9.30	1.00	.....	.....	14.70	2.80	4.96
" Amboy Div.‡‡	154	43	79,967	1,860	53.73	.....	17.42	.....	.....	2.90	5.30	0.60	.....	.....	8.80	2.80	4.98
" Belvidere Div.‡‡	103	35	71,420	2,041	31.50	.....	14.29	.....	.....	3.70	9.00	0.70	.....	.....	13.40	2.80	4.98
" Philadelphia Div.‡‡	191	168	402,809	2,398	26.12	.....	13.44	.....	.....	3.20	4.10	0.70	.....	.....	8.00	1.00	2.72
" Middle Div.‡‡	132	99	308,688	3,118	26.77	.....	17.42	.....	.....	4.20	3.90	0.60	.....	.....	8.70	1.00	2.72
" Pittsb'h Div., E. End‡‡	.....	81	201,399	2,486	20.18	.....	10.66	.....	.....	5.90	5.10	0.70	.....	.....	11.70	1.00	2.72
" Pittsb'h Div., W. End‡‡	.....	102	261,203	2,561	29.74	.....	11.93	.....	.....	3.50	3.50	0.70	.....	.....	7.70	1.00	2.72
" Tyrone Div.‡‡	107	28	55,743	1,991	19.97	.....	20.66	.....	.....	13.80	5.30	0.50	.....	.....	19.60	1.00	2.73
" West Penn. Div.‡‡	104	22	43,372	1,971	37.67	.....	27.47	.....	.....	2.00	2.90	0.40	.....	.....	5.30	1.00	2.73
" Lewistown Div.‡‡	56	7	13,108	1,873	31.91	.....	19.16	.....	.....	3.40	3.30	0.50	.....	.....	7.20	1.00	2.77
" Bedford Div.‡‡	57	5	10,116	2,023	26.78	.....	23.08	.....	.....	1.40	3.80	0.40	.....	.....	5.60	1.00	2.85
Pitts., Fort Wayne & Chicago, Eastern Div.*	371	149	364,589	2,447	43.30	.....	16.48	14.30	0.944	2.46	3.17	0.64	1.60	6.18	14.05	1.37	1.38
Pitts., Cin. & St. Louis, Little Miami Div.*	197	34	99,250	2,612	40.75	.....	12.41	15.29	1.087	4.30	6.67	0.61	2.37	5.73	19.68	2.63	2.00
P., C. & St. L. Div.*	224	80	228,424	2,855	27.54	.....	18.70	18.32	0.890	5.98	3.58	0.55	2.11	5.95	18.17	0.92	2.50
Pitts., Titusville & Buffalo*	158	.....	48,440	.....	42.77	.....	20.46	13.80	1.291	2.95	3.89	0.54	.....	6.09	13.47	.....	.....
St. Louis, Iron Mt. & So., Arkansas Div	325	32	109,305	3,416	.....	36.90	15.80	.....	.....	2.04	6.77	0.46	.....	6.43	15.70	.....	2.50
St. Louis & San Francisco‖	328	.....	66,056	.....	33.90	.....	14.10	.....	.....	3.70	6.31	0.34	.....	5.63	15.98	2.05	1.80
Stockton & Copperopolis	49	3	3,894	1,298	37.44	.....	12.85	.....	.....	1.47	16.53	1.07	0.73	9.03	28.83	6.90	5.75
Terre Haute & Indianapolis, Ind. Div	112	.....	80,182	.....	32.60	.....	20.50	.....	.....	4.17	4.86	0.68	.....	6.06	15.77	1.45	.....
Vandalia Div	158	.....	79,561	.....	31.60	.....	20.40	.....	.....	5.34	5.17	0.77	.....	5.84	17.12	1.43	.....
West Jersey‡‡	128	17	33,286	1,958	44.18	.....	19.01	.....	.....	2.30	8.20	0.50	.....	.....	11.00	3.60	4 20

YEAR 1877.

Atlantic & Great Western	513	185	5,543,281	29,964	38.97	.....	18.96	15.80	.....	3.93	5.07	0.47	0.65	5.98	16.10	1.85	2.89
Cen. Pacific and leased roads†	2067	262	6,614,394	25,246	39.76	28.24	16.93	.....	.....	6.56	17.47	0.65	0.43	8.01	33.12	6.71	5.28
Cleve., Columbus, Cin. & Indianapolis	471	172	5,080,302	29,537	42.47	48.04	24.40	.....	.....	3.57	4.65	0.58	1.01	5.77	15.58	1.75	3.50
Cleveland & Mahoning Valley	41	6	196,599	32,767	43.93	.....	23.53	.....	.....	1.53	4.22	0.30	1.06	6.10	13.21	1.78	2.76
Cleveland & Pittsburgh*	199	91	1,892,869	20,801	48.20	.....	19.71	16.40	0.866	3.49	2.83	0.53	2.26	6.65	15.76	1.20	3.34
Del., Lackawanna & Western, Bloomington Div.‡	80	27	610,250	22,602	.....	.....	33.34	.....	.....	2.95	.....	0.65	.....	5.31	8.91	.....	.....
Detroit, Eel River & Illinois	93	.....	252,387	.....	52.22	30.91	22.91	.....	.....	2.61	6.82	0.44	0.18	3.83	13.88	2.49	2.25
Erie & Pittsburgh*	98	29	628,531	21,674	41.10	.....	16.19	16.90	0.933	3.33	4.44	0.69	2.04	6.74	17.24	1.83	1.82
Ill. Cen., Chicago Div.§	253	76	1,718,728	22,615	37.75	.....	16.03	19.88	0.880	4.11	4.96	0.30	.....	5.96	15.34	1.75	4.21
" " South Div.§	231	50	926,482	18,530	37.83	.....	14.33	15.98	1.080	5.29	4.91	0.33	.....	5.83	16.36	1.75	4.21
" " North Div.§	225	65	987,834	15,197	33.24	.....	13.13	14.78	1.330	6.58	5.54	0.35	.....	6.00	18.47	1.75	4.21
" " Iowa Div.§	401	66	1,177,814	17,846	31.53	.....	16.23	12.44	1.710	4.66	8.54	0.31	.....	6.02	19.54	2.61	4.92
" " Springfield Div., six months§	111	11	170,748	15,523	47.68	.....	15.87	11.84	1.170	3.31	3.17	0.33	.....	5.22	12.04	1.43	2.61
Jeff.. Madison & Indianapolis	226	44	1,055,117	23,980	43.15	27.57	14.68	19.46	1.040	3.69	6.16	0.48	2.27	6.03	18.63	2.50	2.21
Kansas Pacific	781	86	1,831,513	21,297	27.46	.....	12.80	.....	.....	5.23	12.56	0.44	.....	6.91	25.14	3.38	5.06
Kansas City, St. Joseph & Council Bluffs¶	275	31	986,141	31,811	50.20	.....	26.40	18.05	.....	4.30	6.00	0.40	.....	6.60	17.30	2.85	3.50
Lk. Shore & Mich. Southern**	1177	495	10,752,055	21,721	36.49	58.91	22.03	.....	.....	4.83	8.02	0.36	.....	6.01	19.88	.....	.....
Little Rock & Fort Smith	168	.....	170,898	.....	.....	56.34	16.91	.....	.....	2.80	3.50	0.30	.....	5.40	12.00	.....	2.00
Pitts., Fort Wayne & Chicago, Eastern Div.*	371	155	4,186,878	27,012	46.80	.....	17.00	14.10	1.025	3.20	3.48	0.67	1.82	6.46	15.63	1.63	1.63
Pitts., Cin. & St. Louis, Little Miami Div.*	197	41	1,141,465	27,812	43.21	.....	12.81	15.99	1.018	4.15	6.04	0.67	2.46	5.98	19.30	2.52	2.18
Pitts., Cin. & St. Louis., P., C. & St. L. Div.*	224	102	2,547,557	24,976	29.57	.....	16.30	18.03	1.040	7.35	3.82	0.66	2.88	6.36	21.07	1.04	2.92
Pitts., Titusville & Buffalo*	158	.....	669,805	.....	31.54	.....	18.41	15.20	1.328	4.04	4.96	0.62	.....	6.28	15.90	.....	.....
St. Louis, Iron Mt. & So., Arkansas Div.*	325	32	1,024,475	32,015	.....	44.90	17.00	.....	.....	2.70	5.56	0.54	.....	6.52	15.32	.....	2.50
St. Louis & San Francisco‖	328	.....	816,441	.....	33.60	.....	14.30	.....	.....	3.28	6.33	0.37	.....	5.66	15.64	2.13	2.07
Union Pacific	1042	168	5,753,729	34,248	37.21	.....	13.61	.....	.....	6.95	11.31	0.59	.....	10.43	28.55	4.17	5.50
Wabash, Western Division§§	441	67	2,170,406	32,394	33.45	.....	12.56	18.05	1.180	4.70	4.82	0.40	.....	6.79	16.71	1.61	.....

* Five empty freight cars rated as three loaded ones.
† Switching engines allowed 6 miles per hour; helping engines, actual distance run and 4 miles per hour while waiting trains.
‡ Fuel not estimated.
§ Two empty cars rated as one loaded one.
‖ Switching and work-train engines allowed 6 miles per hour; no switching mileage allowed to train engines.
¶ Three empty freight cars rated as two loaded ones.
** Switching engines allowed 6 miles per hour.
†† Water-service and fuel stations, not included above, 1.03 ct. per mile; rental of engines 0.72 ct. per mile; three empty cars rated as two loaded ones; switching and work-train engines allowed 6 miles per hour; no switching mileage allowed to train engines.
‡‡ Wages of engineers, firemen and wipers not included in cost of engines.
§§ Five empty cars rated as three loaded ones; switching engines allowed 6 miles per hour; work-train engines, actual mileage.
The ton of coal is 2,000 lbs., unless otherwise noted; 25 bushels counted to the ton.